ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

1998, Vol. 20, No. 1 (January)

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Blackwell Science

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

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Six issues of *Chemistry International* will be published bimonthly in 1998 (one volume per annum) in January, March, May, July, September and November. The 1998 subscription rate including postage is GBP 75.00 (UK and overseas except North America) or USD 116.00 (US and Canada). The individual subscription rate is GBP 29.00 (UK and overseas except North America) or USD 42.00 (US and Canada). Microfiche subscriptions are available simultaneously with the printed edition, and microfilm at the end of the subscription year. Subscription orders may be placed directly with IUPAC's official publisher, Blackwell Science Ltd, PO Box 88, Oxford, UK; E-mail: journals.cs@blacksci.co.uk. Information on this journal can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

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Despatch. The news magazine is despatched within Europe by surface mail, to other continents by various forms of air-speeded delivery: to the US* by air freight for forwarding by periodicals post, to India by air freight for guaranteeed local delivery, and to all other countries by Accelerated Surface Post.

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*Periodicals postage paid at Rahway, NJ. Post Master, send address changes to *Chemistry International*, c/o Mercury Airfreight International Inc., 2323 Randolf Avenue, Avenel, NJ 07001, USA.

Front cover: Project Sediba: a programme for upgrading physical science and mathematics teachers in Southern Africa (see page 6).

International Union of Pure and Applied Chemistry

Future Mission, Goals and Function of IUPAC

The following article by President Joshua Jortner was published as a Guest Editorial in 'Nachrichten aus Chemie', February 1998, the news magazine of the Gesellschaft Deutscher Chemiker.

Professor Dr. Joshua Jortner

The International Union of Pure and Applied Chemistry (IUPAC) serves as a Scientific, international, non-governmental and objective body in addressing the global issues involving the chemical sciences. The future mission and function of IUPAC should rest on the principles of the globalization of the scientific-technological endeavour, the response to current changes in science and technology, the fast expansion of the boundaries of modern chemistry and the mission oriented service of chemistry.

IUPAC was formed in 1919 by chemists from industry and academia. Over nearly eight decades the Union has succeeded in fostering world-wide communications in the chemical sciences and in uniting academic and industrial chemistry in a common language. IUPAC has long been recognized as the world authority on nomenclature, atomic weights and many other critically evaluated data, and it continues to sponsor major international meetings that range from specialized symposia to CHEMRAWN meetings with societal impact. During the Cold War, IUPAC became an important instrument for promoting world-wide collaboration and communication among chemists.

One of the hallmarks of our era is rapid political, economic, technological and scientific change. With the major changes that have occurred world-wide in chemistry and the chemical industry, IUPAC has examined its role as the organization principally responsible for promotion of the chemical sciences globally. Following a series of meetings to obtain input from leaders in chemistry on four continents, IUPAC has redefined its mission and established goals and strategies to guide its approach to the shaping of the chemical sciences in a rapidly changing world.

IUPAC's Mission is to advance the world-wide aspects of the chemical sciences and to contribute to the application of chemistry to the service of Mankind. In so doing, IUPAC promotes the norms, values, standards and ethics of science.

To further its Mission, IUPAC is currently establishing a set of long-range goals and developing strategic thrusts to provide guidance for the kinds of scientific work the Union undertakes. In addition to initiating and continuing major thrusts on the activities listed above, IUPAC will represent, when appropriate, the interests of chemistry in international governmental and non-governmental forums. Goals have also been established for the Union's contributions to the advancement of world-wide research in the chemical sciences, the promotion of the service of chemistry to society (with attention to the advancement of the chemical sciences in developing countries), and the facilitation of the development of effective channels of communication in the global chemistry community. The Union feels it is important to promote the chemical aspects of industry in its contributions to sustainable development, wealth creation and improvement in the quality of life.

The improvement of chemical education is another IUPAC goal. The Union recognizes that the needs of the developed countries and the developing countries in this regard are quite different. Scientific literacy is the major concern in the developed world. IUPAC's rôle is to act as a clearinghouse for information about national programs. Less developed countries need help and support at all levels of education and training.

IUPAC strives towards globalization of its activities with the participation of the entire world's chemistry community. The broadening of the geographical base will be accomplished by recruiting new National Adhering Organizations. In addition, new mechanisms need to be set up to insure world-wide dissemination of information about IUPAC's work and the drawing of human capital to its activities. The Internet is seen as an opportunity to greatly improve the Union's efforts in both these areas.

To carry out its scientific work (largely in nomenclature, terminology, critical data evaluation and organiza-

tion of scientific symposia), IUPAC has, over many years, developed a network of 37 Commissions. Although an enormous amount of valuable work has been produced, this relatively static structure has now become an impediment to undertaking projects that are widely regarded as relevant to today's world and are completed in a time-frame consistent with the fast pace of modern research and industrial development. We will soon propose to IUPAC's governing bodies major changes that will consolidate the responsibility for initiation and management of scientific projects, each of which will be conducted by a time-limited working party. We plan to reach out to a broad international community of chemists to help define the needs on which IUPAC projects are based and to recruit the most talented chemists world-wide to work on these projects.

Chemistry historically emerged and developed as an interdisciplinary scientific field, with a broad definition of its borders. Paraphrasing Linus Pauling's definition of the chemical bond 'whatever is convenient to the chemist to define as a bond', chemistry can be defined as a discipline encompassing all areas which are of interest for chemists and where molecular science makes significant contributions. The rich and diverse world of modern chemistry encompasses remarkable intellectual accomplishments, scientific creativity and originality and the generation of new knowledge. The quality, relevance and remarkable scope of modern chemistry should preclude any 'identity crises in chemistry', sometimes manifested in the chemistry science and education community regarding the future of the chemical sciences as a central scientific discipline.

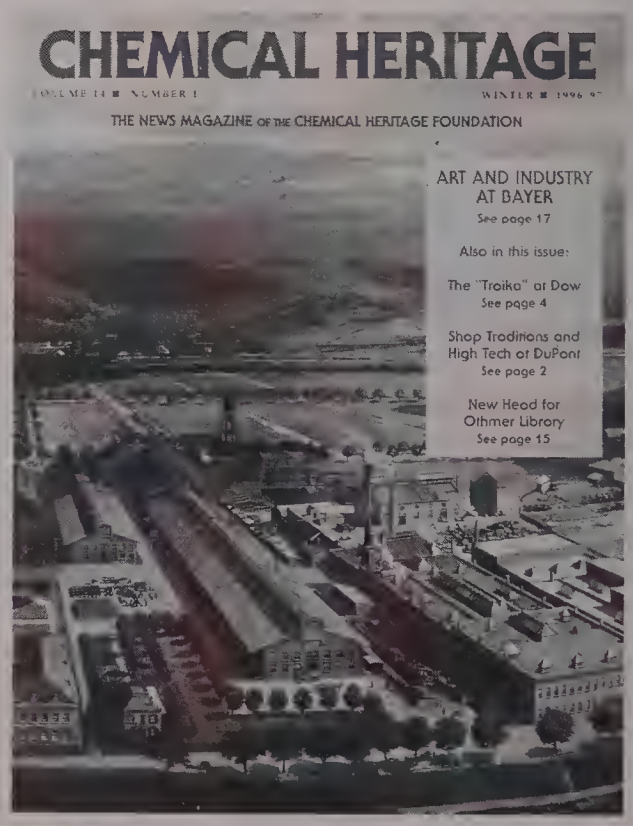
I have discussed changes to the way in which IUPAC operates to fulfil the Union's goals and future mission. The problems with which science and society are faced today are complex and require a reassessment of scientific policy considerations, and an implementation of evolutionary changes in the function and structure of the Union. IUPAC serves the international scientific endeavour in the dual function of a basic science and a mission-oriented Union. The Union is in a unique position to contribute to the central interdisciplinary chemical sciences. Strengthening international chemistry, striving towards inspiring high standards of excellence and relevance in academic and industrial research and promoting the service of chemistry to society and to global issues, these are the visions that shape IUPAC's activities towards the 21st century.

Professor Dr. Joshua Jortner
President of IUPAC

The Chemical Heritage Foundation

A growing resource for the chemical community

The Chemical Heritage Foundation, based in Philadelphia, is rapidly emerging as the chemical community's premier resource for preserving and recording our remarkable heritage, for historical research and scholarship, and for public education.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THE NEWS MAGAZINE OF THE CHEMICAL HERITAGE FOUNDATION
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A recent cover of *Chemical Heritage*, CHF's news magazine. The image on the cover is a painting of the Bayer factory in Albany by Otto Bolhagen of Bremen. *Image courtesy: Bayer AG.*

IUPAC and CHF

The relationship between CHF and IUPAC goes back to 1984, when CHF first received in its archives a number of historical reprints dealing with the International Commission on Atomic Weights of IUPAC. Subsequent years saw further archival deposits, and the establishment of CHF as one of IUPAC's Associated Organizations. In 1996, the Union decided to transfer all of its archival materials to CHF, to prevent further dispersion of historically significant material. In the summer of that year, the Union transferred to CHF 185 boxes of documents dating from 1919 through 1970. The earliest archive box (1919–25) includes such treasures as letters

The exterior of the Chemical Heritage Foundation's permanent home, Spring 1997. *Photograph by Gregory Tobias.*

from Leo Baekeland, Marston Bogert, Arthur D. Little, Fred Rossini, Charles L. Parsons, W. Albert Noyes, and other key figures in the international chemical community. Among general groupings of papers contained in this major donation are those of the Commissions on Organic and Inorganic Nomenclature. The total collection contains a rich compendium of correspondence, notes, conference material, commission proceedings, country files, and IUPAC Bureau documents, accounts, and budgets.

A Brief History of CHF

A detailed article on CHF's origins, mission and goals was printed in *Chemistry International* 1995, **17**, 5. CHF began modestly in 1982, as the Center for the History of Chemistry (CHOC), a pilot project between the University of Pennsylvania and the American Chemical Society (ACS). CHOC's goal was to address the urgent need to document, preserve, and make known the heritage of chemical achievement. In 1984, the American Institute of Chemical Engineers (AIChE) became the third sponsor of the Center.

In 1987, the Center was incorporated as a not-for-profit under the title, the National Foundation for the History of Chemistry, by joint action of ACS and AIChE. The Foundation rented space in a new building at the University of Pennsylvania, and restructured its activities into those of its Beckman Center for the History of Chemistry (established 1987), and its Othmer Library of Chemical History (established 1988).

In 1992, the Chemical Heritage Foundation assumed its present name to better reflect the interdisciplinary nature of the chemical sciences and industries, and the widening public scope of its activities. In 1995, CHF purchased, and in 1996, CHF moved to its permanent home, the First National Bank building at Independence National Historical Park in Philadelphia. Today, CHF enjoys the endorsement and support of 19 professional societies and associations.

An Othmer Library staff member unpacking some of the library's books and journals. Shelving and cataloguing are under way at the library's permanent site in Philadelphia. *Photograph by Gregory Tobias.*

Artist's sketch of a proposed reading room in the Othmer Library. ***Image courtesy: Richard Conway Meyer, Architect.***

Programmes and services

The Othmer Library of Chemical History

CHF fulfils its mission—to foster the heritage of the chemical sciences and industries—in part through the operations of its Donald F. and Mildred Topp Othmer Library of Chemical History. The Othmer Library is a product of the vision and generosity of Donald F. and Mildred Topp Othmer, and underpins all the program activities of CHF. The library is rapidly becoming the premier repository, media resource centre, and research facility for the history of the chemical sciences and industries. The library promotes access to materials on the origins, development, and current directions of the chemical sciences and technologies. Its activities include:

- maintaining a comprehensive reference collection;
- developing special book, manuscript, artefact, and oral history collections;
- collecting papers of chemical scientists and organizations;
- providing database entry to other historical collections; and
- maintaining a pictorial collection, which includes prints, negatives, slides and audio visual items.

The core of the library consists of over 40 000 volumes donated by The Chemists' Club of New York. Valuable additions to the library are being sought and received every day. The library has already grown to over 50 000 books and journals ranging in publication date from 1526 to 1970. An eventual stack capacity of 250 000 volumes is expected.

In 1996, Elizabeth Swan became Directory of Library Services, and set about the daunting task of re-organizing the library in CHF's permanent home. Staff positions were advertised for and filled, and now number four full time and five part-time employees. An acquisitions policy has been drafted to help potential donors identify the materials CHF is looking for. The process of creating an electronic catalogue using the Online Computer Library Center (OCLC) bibliographic system has begun. The objective is to create an online catalogue which will be searchable via internet electronic access. Development of full stack capacity, improved infrastructure, and climate control for rare books and manuscripts are other major goals for the library.

The Staff of *Chemistry International* apologize for the lateness of this issue. It was a result of unforeseen complications of the relocation of the office to Research Triangle Park, North Carolina, USA. We expect to return to a normal printing schedule for the May issue.

The Beckman Center

Made possible by a grant from Arnold O. and Mabel Beckman, the Centre's mission is to undertake basic research on the history of the chemical sciences, to conduct scholarly events of interest to the chemical and historical communities, and to foster public understanding of the chemical sciences. Some examples of Beckman Center programmes include:

- A Spring 1997 symposium on 'The Emergence of Biotechnology: DNA to Genentech', as part of the Center's Biomolecular Sciences Initiative (BIMOSI). The symposium brought together major players in the biotechnology revolution to share reflections and

A gathering of distinguished scientists and historians at a Spring 1997 CHF symposium on 'The Emergence of Biotechnology: DNA to Genentech.' The event was recorded on videotape in front of a live studio audience. [The seated panel is comprised of (from left): Charles Weiner, MIT; Stanley Cohen, Stanford; Maxine Singer, Carnegie Institution of Washington; Herbert Boyer, Co-Founder of Genentech; Moderator Everett Mendelsohn, Harvard; Paul Berg, Stanford; George Rathmann, Amgen and ICOS; William Rutter, Chiron; and Arthur Kornberg, Stanford.] ***Photograph by Harry Kalish.***

assessments from biotech's early years. The videotape of this event represents a significant contribution to the historical archive, and an edited version will be used to create a classroom resource.

- The Oral History Project—A programme in which leading chemical scientists, industrialists, and practitioners are interviewed at length and their lives and careers documented. Over 100 histories have been completed, with individuals from Mildred Cohn to Linus Pauling and Edward Jefferson to Ralph Landau.
- Continuing fellowships and travel grants to support visiting academic scholars and educators, including the Edelstein International Fellowship and Studentship, the Gordon Cain Fellowship on Entrepreneurship and Innovation, and the Eugene Garfield Fellowship. Many visiting and resident scholars use CHF premises to give Brown Bag talks to the wider community about their work.

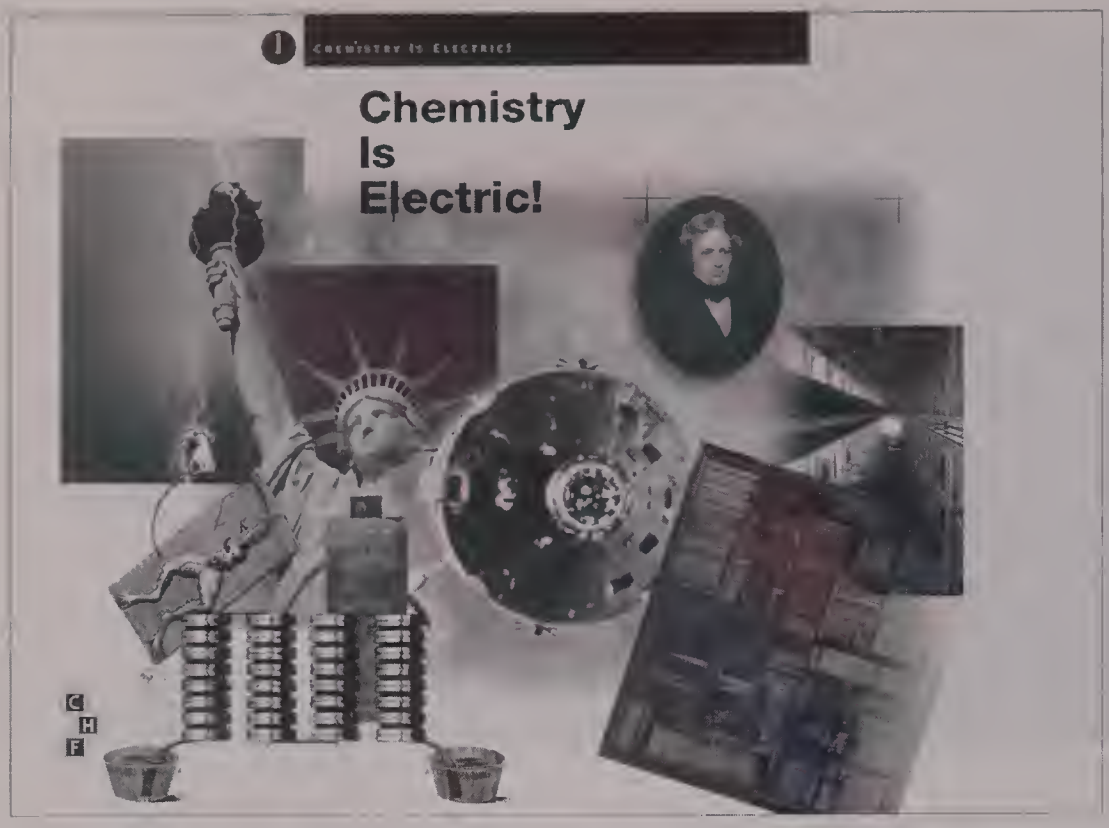
Public outreach

Public outreach activities are a critical part of CHF's mission 'to make known the achievements of chemical scientists and the chemical process industries.' These activities make an enormous contribution to the chemical community and broaden public understanding of the chemical sciences and technologies. Some examples are:

- The Glenn. E. Ullyot Lecture Series (co-sponsored with the ACS, Philadelphia Section and the Chemistry Department, University of Pennsylvania), which explores the impact of the chemical sciences on society. The lecture in 1997 was given by Dr. P. Roy Vagelos, former Chairman and CEO of Merck and Co., Inc.
- Travelling educational exhibits, that highlight the contributions of chemical scientists and the chemical industries to society. The most recent exhibit, *Chemistry is Electric!*, was developed to coincide with the 100th Anniversary of the Dow Chemical Company. These exhibits have been displayed in museums, high schools and cultural centres in the USA and Europe.
- Events throughout the USA, such as a Spring 1997 symposium on 'Innovation and Entrepreneurship in the Petrochemical Industry' at the Annual International Petrochemical Conference, San Antonio, Texas.
- Conversazioni at CHF's home in Philadelphia, which provide opportunities for leaders in the chemical community to speak to the Foundation and its friends.

Publications

CHF's publications activities are growing. CHF's news magazine, *Chemical Heritage*, has expanded into a 48-



A panel from CHF's most recent traveling exhibit: *Chemistry is Electric! Image Courtesy: Joel Katz Design Associates.*

page, four-color publication—one of the largest, most respected heritage periodicals in the world today.

CHF has begun an independent series on Innovation and Entrepreneurship. The first volume, *Everybody Wins! A Life in Free Enterprise*, by Gordon Cain was published in 1997. Next in this series will be Ralph Landau's edited volume on *Pharmaceutical Innovation*. CHF has also published books in partnership with the American Chemical Society and the University of Pennsylvania (recent examples include *Eilhard Mitscherlich—Prince of Prussian Chemistry* by Hans-Werner Schütt, and *Lavoisier—Chemist, Biologist, Economist* by Jean-Pierre Poirier).

CHF is developing timelines on subjects from *Chemical Engineering* to *Electrochemistry* to *Scientific Information*. CHF also produces resources for high-school teachers, including *Chemical Achievers* and *Structures of Life*, and popular publications, like *American Chemical Enterprise* and *Polymer Pioneers*.

Further information about the Chemical Heritage Foundation may be obtained by contacting: Dr Leo Slater, Program Manager, Historical Services Chemical Heritage Foundation, 315 Chestnut Street, Philadelphia, PA 19106, USA. Tel.: 215 925 2222 (x224), fax: 215 925 1954.

Project Sediba: a programme for upgrading physical science and mathematics teachers in Southern Africa

Pieter Steyn & Rufus Wesi

The beginning of 1996 witnessed the establishment of an upgrading programme for physical science and mathematics teachers, called the SEDIBA Project. The SEDIBA (Setswana word for fountain) Project is a partnership involving the Potchefstroom University for CHE, the North West Education Department, and NASCHEM—a division of DENEL, a giant armaments corporation. The project is aimed at improving the quality of science and mathematics teaching by assisting science and mathematics teachers to gain mastery of the subject and to teach it with confidence and commitment. The teaching of these subjects is of fundamental importance in the establishment of high technology industries and wealth creation in the Republic of South Africa. Amidst the recurrent high failure rate amongst matriculation science pupils and reports that local standards in education, particularly that of mathematics and science, are far below the norm, the founding of the SEDIBA Project was a much needed development.

Upon its inception in 1996, the SEDIBA Project registered an initial group of 40 teachers in the physical science stream. In the beginning of 1997, not only did 45 new teachers enrol for the first year of the physical science course, but a new programme for upgrading mathematics teachers was introduced with an initial enrolment of 37. The total enrolment of teachers in both

Rufus Wesi

physical science and mathematics programs to date is 117.

Project SEDIBA comprises two professional development programmes for physical science teachers and mathematics teachers offered on part-time bases. Tuition is done by means of contact teaching involving state of the art computer aided instruction and by means of distance learning. Lectures are offered mostly during school holidays on the campus of the Potchefstroorn University. Courses are presented at an equivalent of first year university level. The physical science stream consists of physics, chemistry, education, didactics of physical science, and computer literacy. Practical work forms an integral part of the physical science programme. The mathematics stream consists of topics in algebra, Euclidean geometry, trigonometry, calculus, education, computer literacy and didactics of mathematics.

Hosted by three academic departments (physics, chemistry and mathematics), project SEDIBA functions under the directorship of Professor Pieter Steyn, who is the head of the Chemistry Department and a member of the Executive Committee of the IUPAC Bureau. Four other senior members from the three above-mentioned departments are also involved in the day-to-day running of the project. As part of its contribution, the North West Education Department seconded two senior science teachers, Mr Wesi and Mr Dolo to the project; both are registered for masters degrees in science education. The management and staff of the SEDIBA Project are pleased that both the planning and organization of the project have been successfully executed. Both the teachers and the lecturing staff are highly motivated and enthusiastic about the project.

The current target of SEDIBA Project is practising secondary school teachers in possession of a 3-year diploma in physical science or mathematics teaching in the North West Province. The financial support from NASCHEM, as part of its social responsibility programme, makes it possible for teachers to enrol for this programme at reduced tariffs. Upon completion of the programme, teachers will obtain a higher education diploma in science or mathematics education. SEDIBA staff members are actively involved in research; investigating numerous aspects of science education such as the situation analysis with regard to the qualification and distribution of science teachers in the North West Province, the use of computer aided instruction, alternative conceptions, and the conceptualization of concepts in both science and mathematics.

Since its inception, the SEDIBA Project is steadily making a difference in the lives of teachers who for a long time tried to teach, however, with little success, and children who emerge from an educational environment characterized by crises, high failure rates, and a lack of a culture of learning. Through 117 teachers, the

SEDIBA Project is reaching out to over 30 000 pupils. Feedback from subject advisors and schools indicates that there has been a marked improvement in the quality of teaching from the SEDIBA teachers. The success of the project is attributed not only to commitment and dedication by both the teachers and the lecturing staff, but also to the fine spirit of cooperation between all the parties involved (that is, NASCHEM, the North West Education Department and the Potchefstroom University). It is envisaged that project SEDIBA will continue to make a considerable impact on the educational system, elevating the levels of science and mathematics education. This will enable more young people, particularly those from previously disadvantaged communities, to qualify for careers as scientists, mathematicians and engineers. The project will be extended to the Mpumalanga Province in 1998. Fifty physical science and mathematics teachers will be involved in a teacher upgrading programme made possible by a generous grant from INGWE, a coal mining company belonging to Gencor.

News

Paul R. Beljaars Becomes President of AOAC International

Paul Raymond Beljaars began his one-year term as President of AOAC International (formerly the Association of Official Analytical Chemists) on 10 September 1997 following the business meeting at the 111th AOAC International Annual Meeting in San Diego, California, USA. Beljaars is the Association's first European President.

Dr Beljaars, an actively involved member of AOAC since the mid-1970s, is now serving his fifth year on the AOAC Board of Directors. Other activities in AOAC have included co-founding the AOAC Europe Low Lands Subsection as well as serving on the Regional Sections Committee, the International Committee, the Methods Committee on Commodity Foods and Commodity Products, the Editorial Board, the Finance Committee, the Annual Meeting Programme Committee, and the task groups on Nominations, Methods Format, and the Bylaws.

When asked about his primary focus while in office, Beljaars responded 'At AOAC, we want to build a stronger international presence and work together with other international scientific organizations to create reliable analytical and microbiological methods worldwide.'

Beljaars, Head of the Chemistry Department's Food Inspection Service of the Netherlands Inspectorate for Health Protection since 1968, has been very active in methods development as the Chair of the Inspectorate's Project Group for Collaborative Studies (PCS). He has also been cofounder, author, and editor of the Dutch Journal *De Ware (N) -Chemicus* published by the Inspectorate for Health Protection.

Dr Beljaars holds a Masters Degree in Organic Chemistry and Food Chemistry from the State University of Utrecht and a Doctoral Degree in Agricultural Sciences from the Agricultural University of Wageningen, the Netherlands.

He is also active in the Netherlands Normalization Institute, the International Standardization Organization, and the European Committee for Standardization.

AOAC International update

Reorganization of the Technical Services Department

AOAC International reorganized its technical services department this year. Mr Scott Coates was appointed as Director of Technical Services in February 1997. Mr Steven Ward is now the Methods Manager, responsible for administering the AOAC® *Official Methods*℠ programme. Ms Anita Mishra is the AOAC Technical Coordinator responsible for administering the *Peer-Verified Methods*℠ and *Performance Tested Methods*℠ programmes. Ms Arlene Fox is the AOAC Programme Coordinator responsible for the administration of the: Technical Division for Reference Material, Technical Division on Laboratory Management, AOAC® *Laboratory Proficiency Testing Programme,* and coordinating international activities.

Method validation Programme Integration

AOAC is reviewing plans to integrate its three method validation programs (*Official Methods*℠, *Peer-Verified Methods*℠ *and Performance Tested Methods*℠) to make all three programmes more internally consistent. A recommendation will be submitted to the Board of Directors in September 1997 at the AOAC Annual Meeting in San Diego, California.

Technical Division on Reference Materials

AOAC established the Technical Division on Reference Materials several years ago to provide a forum to discuss the needs and standards for reference and quality control materials. The Technical Division on Reference Materials has about 500 members and has jointly sponsored the Biological and Environmental Reference Materials (BERM) Symposia held in Antwerp. The next BERM meeting is planned for Baltimore, Maryland, USA in 2000.

Technical Division on Laboratory Management

AOAC established a Technical Division on Laboratory Management in 1997 to provide AOAC members a forum to discuss laboratory management issues. The Technical Division on Laboratory Management will hold an inaugural business meeting at the AOAC International Annual Meeting on September

AOAC Laboratory Proficiency Testing Programme

AOAC is developing a Laboratory Proficiency Testing Programme. Subscribing laboratories will receive test samples for analysis, reports results to AOAC, and then receive a confidential report on how well the analytical results of their laboratory compare to other laboratories.

Annual Meetings

111th AOAC International, Town & Country Hotel, San Diego, California, USA, 7–11 September 1997.

112th AOAC International, The Queen Elizabeth Hotel, Montreal, Quebec, Canada 13–17 September 1998

113th AOAC International, Adam's Mark Hotel, Houston, Texas, USA, 26–30 September 1999

114th AOAC International, Adam's Mark Hotel, Philadelphia, Pennsylvania, USA, 10–14 September 2000

Official Methods of Analysis Compendium

The AOAC® Official Methods of Analysis compendium is available in both hardcopy and CD-ROM format. The 4th Revisions to the 16th edn of the AOAC* Official Methods of Analysis compendium will be available in the Spring of 1998.

IOCD

International Organization for Chemical Sciences in Development

supporting chemistry in developing countries ....

- IOCD Working Groups link chemists in developing countries with distinguished investigators in industrial countries in **collaborative research** on topics in the areas of health, agriculture and industry.
- IOCD organizes laboratory workshops in developing countries to provide chemists hands-on instruction in research techniques.

IOCD is a non-governmental, non-profit agency chartered in Belgium.

IOCD Governance

The Executive Committee of iOCD, comprising the President, Vice-President/Treasurer, Executive Director, and the three working group chairpersons, sets overall policy and programme directions for the IOCD. Advice and assistance on specific issues is available to the Executive Committee from members of the Senior Advisory Council, a panel of distinguished scientists, three of whom are Nobel Laureates.

IOCD Officers

President (1992–1995). Dr Jean-Marie Lehn, Laboratoire de Chimie Supramoléculaire, Université Louis Pasteur, Strasbourg, France.

Vice President/Treasurer. Dr Elkan R. Blout, Division of Biological Sciences, Harvard School of Public Health, Boston, Massachusetts, USA

Inquiries and requests for information about IOCD

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IOCD programme activities

IOCD was created in 1981 by a group of distinguished scientists from 15 countries meeting at UNESCO, Paris, out of a concern about the barriers that hinder the research efforts of chemists in developing countries. Scientific working groups were set up to enable chemists in developing countries to collaborate in research with distinguished investigators of industrialized countries. At present, there are four working groups in IOCD.

IOCD Working Group on Fertility Regulation

Chair: Dr Josef Fried, Chemistry Department, The University of Chicago, Chicago, Illinois, USA
Vice Chair: Dr Stephen Matlin, Commonwealth Secretariat, London, UK.

This working group is carrying out research on the chemistry and mechanism of action of new antifertility agents in the male. These agents are synthesized by chemists in developing countries, members of the working group, and then tested in a biological laboratory in the United States under the supervision of Dr M. James Cosentino.

IOCD Working Group on Tropical Diseases

Chair: Dr Fred Opperdoes, Research Unit for Tropical Diseases, International Institute of Cellular, & Molecular Pathology, Brussels, Belgium

Vice Chair: Dr Jacques Peri6, Laboratoire de Chimie Organique, Biologique, UniversM Pul Sabatier, Toulouse, France.

The Working Group on Tropical Diseases involves chemists in developing countries in synthesis of compounds that are tested as possible new chemotherapeutic agents in the treatment of tropical diseases such as malaria, filariasis, etc.

Working Group on Plant Chemistry

Chair: Dr Kurt Hostettmann, Institut de Pharmacognosie et, Phytochimie, Université de Lausanne, Lausanne, Switzerland.
Vice Chair: Dr Ermias Dagne, Chemistry Department, Addis Ababa University, Addis Ababa, ETHIOPIA, Dr Patrick Moyna, Facultad de Quimica, Montevideo, Uruguay.

The Working Group on Plant Chemistry has organized laboratory workshops on simple bioassay techniques for natural products chemists (1990, Nairobi, Kenya; 1992, Accra, Ghana; 1994, Uruguay; and 1996, Harare, Zimbabwe). In 1996, the workshop was followed by an international symposium on African Medicinal Plants. In 1997, an international symposium on Medicinal Plants from the Americas will convene in Panama).

Joint IOCD–IUPAC Working Group on Environmental Analytical Chemistry

Chair: Dr Waiter R. Benson, Bethesda, Maryland USA.

IOCD and the International Union of Pure and Applied Chemistry (IUPAC) formed this joint working group in 1993 to promote environmental analytical chemistry in developing countries. The group organized its first workshop in May, 1996, in Quito, Ecuador, in collaboration with an Ecuadorian non-governmental organization, Corporacion OIKOS, for 20 analytical chemists to assist them to take part in environmental monitoring.

Concerning IOCD funding....

The programme activities carried on by IOCD are funded by grants received from individual donors and agencies such as foundations, governmental organizations and the United Nations (UNESCO, WHO, etc.). IOCD operates with minimal overhead costs, primarily those for communications and limited travel of members of the Executive Committee. Contributions to IOCD are welcome, those from US citizens being tax-deductible since the IOCD affiliate, called the Organization for Chemical Sciences in Development, Inc. (OCDI), has been declared a **501 (c)(3) tax-exempt organization** by the US Internal Revenue Service.

Please address inquiries to: Dr Elkan R. Blout, Vice President and Treasurer, IOCD, Division of Biological Sciences, Harvard School of Public Health, 677 Huntington Avenue, MA 02115, USA.

Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry* and synopses of these are published in *Chemistry International* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most recent list of the national/regional centres appeared in *Chemistry International* 1997, **17**, 141.

Nomenclature, symbols, units and their usage in spectrochemical analysis—XVII. Laser-based molecular spectrometry for chemical analysis: absorption

(Prepared by G. Gauglitz & D.S. Moore)

This document, part XVII of this series, deals with the fundamentals and applications of laser absorption spectroscopy used in laser-based molecular spectroscopy for chemical analysis. It has four main sections: fundamentals of laser absorption spectroscopy, Doppler-limited spectroscopy, sub-Doppler laser spectroscopy, and time-resolved laser spectroscopy.

Basic aspects of spectral resolution limited by the Doppler width of molecular absorption are treated, application of single mode or multi-mode lasers is discussed, approaches to high-resolution sub-Doppler laser spectroscopy are given, and applications are discussed.

This document does not cover laser-induced effects causing luminescence, which are covered in Part XVI [*Pure Appl. Chem.* 1997, **69**(7), 1435–1449], or scattering processes covered in Part XVIII [*Pure Appl. Chem.* 1997, **69**(7), 1481–1468]. Some relevant common terms have already been defined in Part XVI and are not redefined in this document.

Comments on these recommendations are welcome and should be sent by 1 September 1998 to: Dr D.S. Moore, Group DX-2, Mail Stop C920, Los Alamos National Laboratory, Los Alamos, NM 87545 USA, Fax: +1 (505) 667 0500, e-mail: moored@lanl.gov

Meeting reports

Summary minutes of meetings of the Physical Chemistry Division Committee during the 39th General Assembly of IUPAC, Geneva, 23–27 August 1997

The future structure of IUPAC and the reorganization of the union that is expected as a result of the work of the Strategy Development and Implementation Committee were extensively discussed during the PCD Committee meetings. It was generally felt that changes are needed. The organization is elaborate and inflexible, and the work should be more focused on subjects which are coordinated over an international scale. The present statutes of IUPAC are too vague and nonspecific to allow the measurement of achievements. Its activities can be considered to represent two different interest areas: a scientific side exemplified by the 'Green Book', and data compilation and bodies such as CHEMRAWN and COCI on the other side. It was generally felt that the suggestions for restructuring in the VPCA report, involving the mergers of Commissions of the Analytical and Physical Chemistry Divisions would not result in a more responsive or relevant organization. Divisions and Commissions are criticised for not fulfilling the IUPAC mission, yet this mission remains vaguely defined.

To set the stage for the discussion, each participant of the meeting was asked to answer the question 'Would IUPAC be created if it did not exist?' There was a consensus that an international body is needed for matters such as international nomenclature, atomic weights, tables of thermodynamic and thermophysical properties

of substances of great commercial interest, etc. Such a body is also needed for sorting out units, and to formulate guidelines for presentation and codification in rapidly moving and newly developing fields. It could also act as a pressure group on governments in special issues. This body could be much smaller than the present IUPAC and more flexible, with a short response time. The discussion was centred on the question of what changes are needed in the Physical Chemistry Division in the next 2–4 years. The question was raised, 'What would happen if most or all permanent commissions were abolished?' After some discussion, the Commission Chairmen decided to meet as a group to discuss this question. In the interest of making the Physical Chemistry Division more flexible and relevant they recommended the following:

1 The Commission Chairmen should become a permanent part of the Division Committee which would otherwise be reduced to a few officers and an at-large TM.
2 At least an entire day of each General Assembly meeting should be devoted to discussions of scientific and technological issues as possible candidates for IUPAC projects. This discussion would involve the newly constituted Division Committee. Discussion of administrative issues would not be permitted during this period. Ideas would be circulated in advance of the GA, giving members of the Division Committee time to get input from scientific colleagues outside IUPAC.
3 Such discussions would lead to new projects, perhaps involving members of several Commissions. The Commissions would interpret their missions broadly and this, in time, will lead to appropriate changes in the Commission structure. Coordination with other Divisions would also be possible.
4 The need to keep the Commission structure was emphasized by the comment, 'Abolish the Commissions and IUPAC will die because of lack of projects'.

The Division Committee approved these recommendations and decided to propose to the IUPAC authorities that the membership of the Physical Chemistry Division Committee be changed to Commission Chairmen, a few officers and a position for a titular member from outside the existing Commissions.

Gerd Olofsson
Thermochemistry, Chemical Center, Lund University, PO Box 124, S-221 00, Lund, Sweden

Quantities, Units and Symbols in Physical Chemistry. Commission on Physico-Chemical Symbols Terminology and Units (I.1) at the IUPAC General Assembly 1995, Guildford, UK, 4–7 August 1995

Summary minutes prepared by Martin Quack, Secretary I.1

The Swedish translation of the abbreviated list of Physical Chemical Symbols has just been published and a German translation of the green book is underway. There seems to be a need for a better coordination of the translations. Further possible translations (into French, Italian, etc.) were discussed.

The versions of the green book for the 3rd edition, with the new title *Physical–Chemical Quantities, Units and Symbols*, which is planned for 1998, were discussed in detail. Of the numerous topics, we shall mention here only the more general issues which remained unresolved and still need further discussion. The question of the definition of the 'Electrochemical Potential' has been discussed and it was decided that a small subcommittee of five people, formed by some members of I.1 and I.3 (Electrochemistry) should prepare a definitive formulation which is acceptable to both I.1 and I.3 until the next meeting.

The central term 'amount of substance' remains controversial because of its clumsiness. Possible alternatives were discussed, with the idea of introducing a clearly technical term, which is not taken from the English language, such as 'enplethy' (from Greek, similar to enthalpy, energy, entropy), 'Stoffmenge' (from German) 'Stoffamount' mixed (German and English) and 'ment'.

In a meeting with I.5 (Spectroscopy) the introduction of an SI consistent unit for the quantity wavenumber (rarely called also 'repetancy') was discussed. One proposal is 1 Berg = 1 Bg = 1 m^{-1} (in analogy to 1 Hz = 1 Hertz = 1 s^{-1}). The frequently used unit 1 cm^{-1} would be replaced by 1 hBg (hectoberg), which is SI consistent and easily pronounced.

Meeting of the Commission on Biophysical Chemistry (I.7), Geneva, Switzerland, 24–25 August 1997

Helmut Hauser, as the Commission Chairman, first gave an overview of the directions that IUPAC was being urged to take. A more restrictive policy in selecting IUPAC projects will be adopted. Future IUPAC projects should be timely, highly relevant to the chemical community and completed in a reasonable period of time.

The main items on the agenda were the review of ongoing projects and the discussion of feasibility studies. The project 'Recommendations for the Presentation of NMR Structures of Proteins and Nucleic Acids' coordinated by Kurt Wüthrich has been completed and is scheduled for publication in *Pure and Applied Chemistry* by the end of 1997. The plan is to also have it pub-

lished in the *Journal of Molecular Biology,* the *European Journal of Biochemistry, Biochemistry* and the *Journal of Biomolecular NMR*. There was a general consensus among the members of Commission I.7 and the Division Committee that this document represents an important contribution by IUPAC. It will prove very valuable in the standardization of the reporting of NMR structures of proteins and nucleic acids.

In a joint meeting with the Electroanalytical Chemistry Commission V.5 (R.P. Buck, Chairman) Daniel Thévenot's project on Electrochemical Biosensors was reviewed. A 'final' document has been sent to eight journal editors, about 20 experts and the members of the two commissions involved. It has already been approved by the Interdivisional Committee on Nomenclature and Symbols (IDCNS). The present definition of biosensors excludes 'single use devices'. This fact has turned into a contentious issue that needs to be resolved satisfactorily in the final document. The completion date of this project is 1998.

Robert Goldberg's project on 'Thermodynamics of Enzyme-Catalyzed Reactions' was discussed in a joint meeting with the Thermodynamics Commission I.2 (W. Wakeham, Chairman). This project, which is now formally complete, has led to three publications in the *Journal of Physical and Chemical Reference Data:*

- R.N. Goldberg & Y.B. Tewari. Thermodynamics of enzyme-catalyzed reactions: Part 3. Hydrolases. *J. Phys. Chem. Ref. Data* 1994, **23**, 1035–1103.
- R.N. Goldberg & Y.B. Tewari. Thermodynamics of enzyme-catalyzed reactions: Part 4. Lyases. *J. Phys. Chem. Ref. Data* 1995, **24**, 1669–1698.
- R.N. Goldberg & Y.B. Tewari. Thermodynamics of enzyme-catalyzed reactions: Part 5. Isomerases and Ligases. *J. Phys. Chem. Ref. Data* 1995, **24**,1765–1801.

Robert Goldberg pointed out that the database needs updating as new information appears in the literature. There is now a need and an opportunity to derive Gibbs free energies and enthalpies of formation for biochemical substances from thermodynamic network calculations.

Hans-Jürgen Hinz and Fred Schwarz presented the third draft of a document dealing with 'Recommendations for the Measurement and for the Presentation of Results Obtained on Biological Substances with Scanning Calorimetry'. The scope of the final document was discussed in detail. To finalize the project in 1999 the working party will meet twice within the next year.

Martin Caffrey reported on the status of the project on 'Nomenclature for Lipid Mesophases'. He summarized the objectives of the project and described his strategy for realizing these objectives. A first version of a document entitled 'Recommendations for a Lipid Phase Nomenclature' has been drafted by the working party and this will serve as a basis for the preparation of the final document. The expected completion date is 1999.

Helmut Hauser reported on the status of the project 'Terminology in the Field of Lipid Vesicles'. The recent expansion and numerous new developments in this field of research called for an updating of the existing document written by Lisbeth Ter-Minassian-Saraga. For this purpose a new working party has been formed and an amended version of the document is due within the next year. The expected completion date is end of 1998.

In a joint meeting with the Electrochemistry Commission (I.3), Fred Hawkridge and George Wilson reported on the status of the joint project 'Redox Potential Measurements of Proteins'. Current plans include making the report consistent with the IUPAC Green Book, collecting and incorporating the comments of various expert reviewers, and producing a final version to be sent to IDCNS for approval in 1998.

Terry Stouch presented his feasibility study on 'Recommendations for Reporting the Results of Computations in Biophysical Chemistry'. Stouch has established a well-balanced working party of experts who concluded unanimously that there is a need for guidelines for the presentation of computational results. All members of the Commission agreed that this subject is of great importance to science and that it warrants the initiation of a new IUPAC project. It is conceived as a joint project with Professor J.E. Boggs of the subcommittee on Theoretical Chemistry of Commission I.5.

The time left was used for discussion of possible future projects that might be undertaken within Commission I.7 or as joint projects with other commissions. In several joint meetings with Commissions of the Physical Chemistry Division and also other Divisions the need for good coordination and collaboration within IUPAC was emphasized. John Ralston, Chairman of Commission I.6, stressed that making use of existing expertise within IUPAC by optimizing coordination and collaboration is preferable to generating new IUPAC bodies.

*Dr John R. Moody, Chairman, acting for the vacant position of Secretary

Minutes of the 6th Meeting of the Commission on Isotope Specific Measurements as References (II.4), University of Geneva, Geneva, Switzerland, 27 August 1997

Present:
Dr John R. Moody (Chairman)
Prof. Kensaku Okamoto
Dr John W. Gramlich
Dr Andreé Lamberty

Prof. Kevin J.R. Rosman
Dr Philip Taylor
Dr Robert Vocke
Prof. Paul De Bièvre
Prof. Klaus G. Heumann

Apologies for absence: Prof. Robert F.M. Herber

'The International Measurement Evaluation Programmes (IMEPs) for rounds 1–6 have been completed, with the exception of several publications that are in press or prepared for review. The concept of comparing the 'state of the practice' to a reference value established by isotope specific measurements traceable to the SI have been well received by programme participants and by IUPAC. The practice is likely to spread through the development of numerous regional IMEP programmes initiated by Prof. De Bièvre, thus multiplying the influence of the Commission programmes.

Summary

The members were welcomed to the meeting by Dr J.R. Moody. The minutes of the 4th Meeting of the Commission II.4 in Guildford, UK on 6–7 August 1995, were adopted as distributed. The agenda of the 6th meeting was adopted without amendments. New officers were elected with Prof. K. Okamoto assuming the position of Chairman. Dr J. Moody will continue service for two more years as Secretary in order to assure a smooth transition. Prof. Z. Motion of China and Dr H. Felber of Switzerland were nominated as titular members. All members were asked about their eligibility status. A new member list will be circulated after the Geneva meeting. With the new Commission leadership, a special meeting in Tsukuba, Japan hosted by Prof. Okamoto was proposed for 1998. This meeting will serve to bring together the new titular members and officers to discuss and plan the future work of the Commission. With at least four laboratories participating as certifying laboratories, close communication and planning is vital for the programmes in progress. In addition, the newer members will be assuming more leadership roles and thus will need the advice and guidance of previous officers. A special budget request will be prepared for this meeting.

Review of the current rounds of the International Measurement Evaluation Programmes (IMEPs)

IMEP round 6—Trace Elements in Water
The active portion of this programme concluded in 1995. In addition to the previous publication, the results have been prepared for submission to 'Accreditation and Quality Assurance.'

IMEP round 7—Trace Elements in Human Serum
The samples have been received and distributed to the 'certifying' laboratories. The submission of samples to participants should occur early in 1998 with programme conclusion expected in 1998.

IMEP round 8—Carbon Isotope Ratios in CO_2,
This programme will not begin until 1998 and is not expected to conclude until 2000. It is not listed with the current IUPAC Programme Information Files.

IMEP round 9—Trace Elements in Natural Water
Samples have been obtained and 'certifying' laboratories have been identified. Sample distribution would not begin until 1998, with the expected conclusion of the programme in 1999.

IMEP round 10—Trace Elements in Polyethlene
The necessary samples have been obtained and 'certifying' laboratories have been approached for measurements. Some measurements have begun. The programme is expected to conclude in 1999.

IMEP round 11—Trace Elements in Car Catalysts
This programme and a previously announced programme for trace elements in soils are both delayed and are not given in the current IUPAC Programme Information Files.

Future rounds under consideration
Action on these items is deferred until the special meeting to be held in Tsukuba in 1998.

The next meeting of the Commission will be held in Berlin in 1999. A special meeting of the major programme 'certifiers' will be held in Tsukuba, Japan in 1998.

Final report of the Working Party on Recycling of Polymers

The Working Party on Recycling of Polymers, consisting of 12 experts from 7 countries, was created by the Macromolecular Division (IV) in 1993. It held three meetings, produced 10 papers describing various aspects of the current state of polymer recycling, sponsored a Microsymposium on the same subject that took place in Prague in July 1997, and formulated a set of recommendations. The Working Party concluded its final work by correspondence.

The recommendations of the Working Party were adopted unanimously by the Macromolecular Division on 26 August 1997 at the IUPAC General Assembly in Geneva. The papers and the recommendations will be published together with the proceedings of the Prague Microsymposium on Polymer Recycling in

Macromolecular Symposia. On the recommendation of its chairman, the Working Party was then disbanded, having accomplished its assigned task.

Norbert M. Bikales
Chairman of the Working Party

Summary Minutes—Commission on Spectrochemical and other Optical Procedures for Analysis (V.4), of the General Assembly meeting, Geneva, Switzerland, 23–27 August 1997

Alignment for change

What is relevance? In terms of spectrochemical analysis, it means recommendations that get used and documents that meet real needs. To bring some of the many recommendations from V.4 into the light, several tactics were taken. First, our venerable chair Tuan Vo-Dinh, and John Bertie, the chair of I.5, wrote an article for *Applied Spectroscopy*, which presented the products of both commissions and described the objectives of the ongoing work. There has been strong positive response to the article, especially in the number of inquiries for reprints and preprints.

Secondly, all our documents were placed on the Internet at the IUPAC site on the RSC server (*Eds note: these have been moved to the new IUPAC web site at http://www.iupac.org*). An introductory page was written containing the links to the various recommendations and provisional recommendations. As these are stored in PDF format, Acrobat Reader (available free) allows easy printing as originally published and complete text searching.

Thirdly, a number of relevant journal editors were approached to advertise the presence of the web site and the electronic forms of our documents, as well as to place a link to the site in their own web pages if they had them. All were extremely happy to do so. To produce useful documents that meet real needs, the pulse of technology-driven advances in optical methods for analysis continues to be taken by the members of V.4 and their contacts and colleagues. Yearly meetings and other venues are used to brainstorm about new projects deemed to meet some of these needs. Whether these be nomenclature documents to sort out confusion in newly developing fields or critical assessments to help researchers and analysts evaluate competing new technologies, the high energy of commission members is used to rapidly produce appropriate publications.

Next meeting: Commission members will convene at a mini-meeting during Europtode in Münster, Germany, 20 March 1998.

D.S. Moore, Secretary V.4

Conferences

100th Anniversary of the Serbian Chemical Society

The Serbian Chemical Society (SCS) was, founded on 27 November 1897 in Belgrade as the 10th oldest chemical society in the world. The initial task of the society included the exchange of Information and reporting on innovations and new developments in all areas of chemistry, presentation of original research results by society members, consultation on practical problems in chemistry, the use of chemical knowledge for the benefit of national economy, problems in chemical education and efforts to improve the status of chemists in Serbia

The activity of SCS was temporary interrupted by World War 1 but was continued soon after so that, in 1927, in the new state, the society war able to transform into 'The Chemical Society of the Kingdom of Yugoslavia'.

The publication of the Journal of the society, *Bulletin de la Societe Chimique du Royaume de Yugoslavie,* commenced In 1930 but was put to a stop by World War II. Immediately after the war, the work of SCS and the publication of the journal *Bulletin de la Societe Chimique* were renewed; since 1985, the name was changed to *Journal of the Serbian Chemical Society,* published in English.

Current activities of SCS, with a membership approaching 3000 and 15 affiliations in all major cities, are mainly concerned with the organization of national and international scientific meetings in different areas of chemistry, chemical technology and metallurgy (19 sections), specialized seminars in chemical education,

summer schools, lectures by prominent scientists and the publication of the official journal (12 issues of the 61st volume in 1996) and the *Chemical Review* (31st volume), the latter primarily intended for students.

At the celebration of the Centennial, 23–27 September, these and other achievements wore presented in detail by the presidents of SCS and the organizational committee, Professors J. Jovanovic and Z. Cekovic. The festivity also offered an opportunity to reaffirm international relations and the position of the society. At the official Assembly ceremony, SCS was offered best wishes and received congratulations by Sir Derek Barton, representing IUPAC, and by delegates and members of numerous chemical societies (Richard R. Ernst, Ronald Breslow, Pierre Potier etc.).

In the scientific programme, plenary lectures were delivered by the following speakers from abroad: Ronald Breslow (USA), John H. Beynon (UK), Richard R. Ernst (Switzerland), Armin de Meijere (Germany), Norman L. Allinger (USA), Derek H.R. Barton (UK), Pierre Potier (France), Keith Bowden (UK), Michael Smith (Canada), Lev Aleksandrovich Gribov (Russia) and Eberhard Schurmann (Germany).

Plenary lectures were also delivered by Radoslav Adzic, Slobodan Macura and Gordana Vunjak-Novakovic, members of SCS working currently abroad, and by Aleksandar R. Despic (Belgrade), Ivan Gutman (Kragujevac) and Miroslav J. Gasic (Belgrade).

The programme of the Anniversary included the presentation of several SCS special publications and of the jubilee post stamp, the exhibition 'The World of Chemistry' and various Social events.

Miroslav J. Gasic
Serbian Chemical Society, Karnegijeva 4, 11000 Belgrade, Yugoslavia 4, Tel./fax: +381 11 337 04 67, e-mail: SHD@elab.tmf.bg.ac.yu Internet: http://ihtmceh4.tmf.bg.ac.yu/htdocs/shd100.htm

Federation of European Chemical Societies

FECS General Assembly meeting

The General Assembly of the Federation of European Chemical Societies was held on 11–12 September 1997 at the Technical University of Vienna, Austria, at the invitation of the Geselischaft Osterreichischer Chemiker. Local arrangements were made by Dr P. Czedik Eysenberg. The President, Prof. Lauri Niinisto (Association of Finnish Chemical Societies), was in the chair and delegates from 24 member societies attended, together with representatives of FECS Divisions and Working Parties.

The President of the GÖCh, Dr W. Unger, welcomed the delegates to Vienna on the occasion of the 100th anniversary of the Gesellschaft Österreichischer Chemiker. A scroll conveying greetings from FECS to mark the GÖCh 100th anniversary had been presented at an earlier celebratory meeting.

FECS Lecture

Professor Dieter Oesterhelt, Max-Planck-Institute für Biochemie, delivered the 1997 FECS Lecture on the subject of 'Farbenspiel einer Ionenpumpe'—'Colour changes of an ion pump' on 8 September at the celebratory meeting marking the occasion of the GÖCh 100th anniversary.

The 1998 Lecture will be given by Professor Alex Johnstone, University of Glasgow, at the First European Conference on Chemical Education in Budapest in August 1998.

FECS Award

The FECS President, Professor L Niinisto, presented the FECS Award for 1997 to Professor Ernö Pungor, one of the founders of the former Working Party on Analytical Chemistry, for his very valuable contribution to the work of FECS over many years. Professor Pungor (b. 1923) has had an extensive university career, having been first Professor of Analytical Chemistry at the Technical University in Veszprem and then in a similar position in Budapest. He has also served as Minister for Science and Technology and is currently Director General of Bay Zoltán Foundation for Applied Research. Within FECS, he served as Chairman for the Working Party on Analytical Chemistry in 1981–87 and organized the 2nd Euroanalysis Conference in Budapest in 1975. His best known research accomplishments involve the theory and applications of ion-selective electrodes.

Chemistry and the environment

The FECS Working Party on Chemistry and the Environment, under its new chairman Prof. A. Astrup Jensen, Danish Chemical Society, is developing a major action programme with a number of

new activities, including aspects of water chemistry. The Working Party aims to create subgroups in specialist areas which will help to strengthen networks and involve other existing European groupings. Contact with the European Environment Agency in Copenhagen is being developed. The involvement of all FECS member societies is strongly encouraged.

Younger chemists

An enthusiastic welcome was given to proposals that the FECS should take a greater responsibility for meeting the needs of younger members of national chemical societies and clearly demonstrate to them an interest in helping to promote their ideas. In the first place, statistics and other information on the levels of involvement of younger chemists in national chemical societies will be collected and a report produced for wide circulation and discussion. At the same time, ways of promoting internet discussion groups will be explored and a small group of younger chemist representatives from national societies will assist in this project.

Euchem

FECS believes there is an urgent need to improve its approach to promoting conference activity, bearing in mind the variety of activity carried out by, for example, Euchem, Euresco, NATO Workshops and Gordon Conferences in Europe. For some years, the Euchem Committee has been an integral part of FECS and therefore has a remit to operate on a pan-European basis. Some encouragement will be given to the Euchem Committee to help it develop the involvement of a greater number of FECS member societies and thus more visibly represent the aims and objectives of FECS. (A link between the Euchem Committee and Euresco already exists.)

Guide of European Museums with collections on the History of Chemistry. The *Guide*, which is produced by the FECS Working Party on History of Chemistry, is being updated and reprinted. Further information on the new issue is available from Prof. H.A. Deelstra, University of Antwerp (UIA), Tel.: +32 3 820 2715, fax: +32 3 820 2734, e-mail: Labrom@uia.ac.be

Conference Calendar

1998

Environmental Chemistry

15–20 March1998

CHEMRAWN XI^{v}—Latin American Symposium on Environmental Chemistry, 15–20 March 1998, Montevideo, Uruguay

Prof. Patrick Moyna, Decano, Facultad de Quimica, Avda. General Flores 2124, Montevideo, Uruguay. Tel.: 598 2 924 18 84, fax: 598 2 924 19 06, email: gueiqa@bilbo.edu.uy, Web Page: http://bilbo.edu.uy/reunion98

Chemical thermodynamics and calorimetry

5–9 April 1998

International Conference on Chemical Thermodynamics and Calorimetry, Campinas, Brazil.

Watson Loh, Instituto de Quimica-UNICAMP, Caixa Postal 6154, 13081-970, Campinas, Brazil. Tel.: +55 192397881, fax: +55 192393805, e-mail: wloh@iqm.unicamp.br, Web Page: http://circe.iqm.unicamp.br/~whol/conf

Trace element speciation in biomedical, nutritional and environmental sciences

4–7 May 1998

1st International Conference on Trace Element Speciation in Biomedical, Nutritional and Environmental Sciences, Neuherberg, Munich, Germany.

Prof. Dr Peter Schramel, GSF-Forschungszentrum fur, Urnwelt und Gesundhuit GmbH, Institut fur Okologische Chemie, Neuherberg, D-85758 Oberschleissheim, Germany. Tel.: +08931874062.

Secretariat: Ulla Schrödel, GSF-Forschungszentrum, Postfach 1129, D-85758 Oberschelißheim, Germany. Tel.: +49 89 3187 3030, fax: +49 89 3187 3362.

Automation and new technology for the clinical laboratory

24–27 May 1998

International Congress on Automation and New Technology for the Clinical Laboratory, Santiago de Compostela, Spain.

Dr Ramon Galimany, Sociedad Espanola de Bioquimica Clinica y Patalogica Molecular, Padilla 323-325 Desp 68, ES 08025 Barcelona, Spain. Tel.: +34 3 446 26 70, fax: +34 3 446 26 72.

Degradation processes in the environment

24–28 May 1998

Measuring, Modelling, and Predicting Degradation Processes in the Environment, Dubronik (Cavtat),

Croatia.
Dr Aleksandar Sabijic, Institute Rudjer Boskovic, PO Box 1016, HR-10001 Zagreb, Croatia. Tel.: +385 1 456 1089, fax: +385 1 272 648, e-mail: sabljic@olimp.irb.hr

Organic synthesis

28 June–2 July 1998
12th International Conference on Organic Synthesis (12-ICOS), Venice, Italy.
Prof. Carlo Scolastico, Dip.to di Chimica Organica e Industiale, Università di Milano, Via G. Venezian 21, I-20133 Milano, Italy. Tel.: +39 2 236 7613, fax: +39 2 236 4369, e-mail: nicotra@imiucca.csi.unimi.it

Heteroatom chemistry

5–11 July 1998
Fifth International Conference on Heteroatom Chemistry, London, Ontario, Canada.
Prof. Kim M. Baines, Department of Chemistry, University of Western Ontario, London, Ontario, Canada, London, Ontario N6A 5B7, Canada. Tel.: (519) 661-2166, fax: (519) 661-3022, e-mail: kbaines2@julian.uwo.ca

Chemistry in Africa

6–10 July 1998
7th International Conference on Chemistry in Africa, South Africa.
Prof. T. M. Letcher, Department of Chemistry & Applied Chemistry, University of Natal, Durban 4041, South Africa. Tel.: +31 260 3090, fax: +31 260 3091, e-mail: letcher@che.und.ac.za

Macromolecules

13–17 July 1998
37th International Conference on Macromolecules (MACRO '98), Gold Coast, Australia.
Prof. R. Gilbert, Chemistry School, Sydney University, NSW 2006, Australia. Tel.: +612 9351 3366, fax: +612 9351 3329

Photochemistry

19–24 July 1998
XVII IUPAC Symposium on Photochemistry, Sitges, Spain.
Prof. Josep Font i Cierco, Departament de Quimica, Universitàt Autonoma de Barcelona, Bellaterra, 08193 Barcelona, Spain. Tel.: +34 3 581 1255, fax: +34 3 581 1265, e-mail: iqorfont@cc.uab.es

Polymeric materials

20–23 July 1998
Mechanical Behaviour of Polymeric Materials, 18th Discussion Conference.
Dr Jaroslav Kahovec, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nám. 2, 162 06 Prague 6 - Petriny, Czech Republic. Tel.: +4202360341, fax: +4202367981, e-mail: sympo@imc.cas.cz

Chemical thermodynamics

26 July–1 August 1998
15th International Conference on Chemical Thermodynamics, Porto, Portugal.
Prof. Manuel A.V. Riberio da Silva, Department of Chemistry, Faculty of Science, Rua do Campo Allegre, 687, P-4150 Porto. Tel.: +35 12 6082821, fax: +35 12 2008628, e-mail: risilva@fc.up.pt

Novel aromatic compounds

2–7 August 1998
9th International Symposium on Novel Aromatic Compounds (ISNA-9), Hong Kong.
Prof. Henry N.C. Wong, Department of Chemistry, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong. Tel.: +852 2609 6344, fax: +852 2603 5057, e-mail: hncwong@cuhk.edu.hk

Pesticide chemistry

2–7 August 1998
9th International Congress on Pesticide Chemistry, London
Dr John F. Gibson, Scientific Secretary, The Royal Society of Chemistry, Burlington House, London W1V 0BN.

Solubility phenomena

5–8 August 1998
Eighth International Symposium on Solubility Phenomena, Niigata, Japan.
Kiyoshi Sawada, General Secretary of the 8th ISSP, Department of Chemistry, Faculty of Science, Niigata University, Niigata 950-21, Japan. Tel.: +81 25 262 6265, fax: +81 25 262 6116, e-mail: issp@sc.niigata-u.ac.jp

Chemical education

9–14 August 1998
15th International Conference on Chemical Education: Chemistry and Global Environmental Change,

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should write to the IUPAC Secretariat (see inside back cover for address) requesting an Advanced Information Questionnaire (AIQ). Completed AIQs should be returned to the Secretariat preferably 2 YEARS and at least 12 months before the conference. Late applications will not be considered. Further information on granting of IUPAC sponsorship was published in *Chem. Intl.* 1992, **14**, 203.

Egypt.
Prof. Saad S.M. Hassan, Department of Chemistry, Faculty of Science, Ain Shams University, Cairo, Egypt. Fax: +20 2 831836, e-mail: iupac15@asunet.shams.eun.eg

Carbohydrate symposium

9–14 August 1998
19th International Carbohydrate Symposium, San Diego, CA, USA.
Prof. David A. Brant, ICS 98 Symposium Secretariat, Department of Chemistry, University of California, Irvine, CA 92697-2025, USA. Tel.: (714) 824-8976, fax: (714) 824-1372, e-mail: ics98@uci.edu, Web Page: http://www.ics98.uci.edu

Physical organic chemistry

16–21 August 1998
14th International Conference Physical Organic Chemistry, Florianopolis, Brazil.
Prof. Eduardo Humeres, Department of Chemistry, Universidade Federal de Santa Catarina, Campus Univeritario-Trindade, 88040-900 Florianopolis, Brazil. Tel.: +55 48 231 9219, fax: +55 48 231 9711/231 9688, e-mail: humeres@mbox1.ufsc.br

Co-ordination chemistry

31 August–September 1998
33rd International Conference on Co-ordination Chemistry
Dr Ivano Bertini, Chairman, University of Florence, 33rd ICCC Secretariat, Department of Chemistry, FLorence 50121, Italy. Tel.: +39 55 2757 549, fax: +39 55 2757 555, e-mail: ICCC@rics.lrm.fi.cnr.it

Electrochemistry

13–18 September 1998
International Society of Electrochemistry, Kitakyushu, Japan.
Prof. Erika Kalman, 1025 Budapest, Central Research Institute for Chemistry of the Hungarian Academy of, Sciences, Pusztaszeri út 59-67, Hungary. Tel.: +36 1 325 7548, fax: +36 1 325 7509, e-mail: kale@cric.chemres.hu

Chemistry of germanium, tin and lead

20–25 September 1998
9th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin & Lead (ICC0C GTL-9) Melbourne, Australia.
Prof. Dainis Dakternieks, Deakin University, Biological & Chemical Sciences, Geelong 3217, Australia.

Supramolecular science and technology

27 September–3 October 1998
1st International Conference on Supramolecular Science & Technology, Zakopane, Poland.
Marek Pietraszkiewicz, Chairman of the ICSS&T, Polish Academy of Sciences, Kasprzaka 44/52, 01224 Warsaw. e-mail: pictrasz@ichf.edu.pl

Chemistry of natural products

11–16 October 1998
21st IUPAC symposium on the Chemistry of Natural Products, Beijing, China.
Prof. Xiao-Tian Liang Institute of Materia Medica Chinese Academy of Medical Sciences 1 Xian Nong Tan Street Beijing 100050 China. Tel.: +86 10 6 301 3366-245, fax: +86 10 6 301 7757.

Excitonic processes in condensed matter

2–5 November 1998
Third International Conference on Excitonic Processes in Condensed Matter, Boston, MA, USA/
Prof. William M. Yen, Department of Physics and Astronomy, University of Georgia, Athens, GA, USA. 30602-2451. Tel.: (706) 542-2491, fax: (706) 542-2492, e-mail: wyen@hal.physast.uga.edu

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes (I8FD4), Osaka, Japan.
Prof. Yasuhiko Shirota, Osaka University, Faculty of Engineering, Yamadaoka, Suita, Osaka 565, Japan. Tel.: 81 6 879 7364, fax 81 6 877 7367, e-mail: shirota@ap.chem.eng.osaka-u.ac.jp

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, Director Gen-

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

eral, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: [254] 2 521003, fax [254] 2 520023 e-mail: p.sanchez@cgnet.com

Polymerization methods

12–15 July 1999
Advances in Polymerization Methods, 39th Microsymposium, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6-Petriny, Czech Republic. Tel.: +42 2 360341, fax: +42 2 367981, e-mail: sympo@imc.cas.cz

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. Tel.: +44 (151) 794, fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6-Petriny, Czech Republic. Tel.: +42 2 360341, fax: +42 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Sendai 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911, e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium, SAC 99, Dublin, Ireland.
Prof. Malcolm R. Smyth, School of Chemical Sciences, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 7045308, fax: +353 1 7045032, e-mail: smyth@ccmail.dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777, fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MWIC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169, Japan. Tel.: 81 3 5286 3120, fax: 81 3 3209 5522.

2000

High temperature materials chemistry

1 January 2000
International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), D-52425 Julich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Bio-organic chemistry

First quarter 2000
5th IUPAC Symposium on Bio-Organic Chemistry, (ISBOC-V), New Delhi, India.
Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 (471) 491 459, fax: +91 (471) 490 186.

Macromolecules

9–14 July 2000
International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Dr Stanislaw Penczek, 90-363 Lodz, Sienkiewicza 112, Poland. Tel.: +48-42 819815, fax: +48-42 847126.

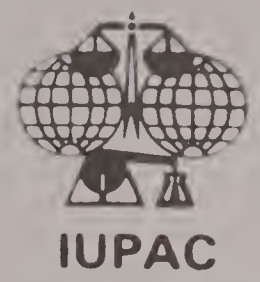
Natural products

1 September 2000
22nd International Symposium on Chemistry of Natural Products, Sao Paulo, Brazil.
Prof. Dr Otto R. Gottlieb Rua 5 de julho 323, Apt. 1001, 22051-030, Rio de Janeiro 22051-030, Brazil.

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV, Postfach 150104, Theodor-Heuss Allee 25, D-60061 Frankfurt/Main, Germany. Tel.: +49 (69) 7564 205, fax: +49 (69) 7564 302.

International Union of Pure and Applied Chemistry (IUPAC)



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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries
- to study topics of international importance to pure and applied chemistry which need standardization, or codification
- to co-operate with other international organizations which deal with topics of a chemical nature
- to contribute to the advancement and understanding of pure and applied chemistry in all its aspects

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

National Adhering Organizations

Academy of Scientific Research and Technology **(Arab Republic of Egypt)**
Asociación Química Argentina **(Argentina)**
Australian Academy of Science **(Australia)**
Ôsterreichische Akademie der Wissenschaften **(Austria)**
Nationaal Comité voor Scheikunde/Comité National de Chimie **(Belgium)**
Brazilian Chemistry Committee for IUPAC **(Brazil)**
National Research Council of Canada **(Canada)**
Sociedad Chilena de Química **(Chile)**
Chinese Chemical Society, Beijing and Chemical Society located in Taipei **(China)**
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Czech National Committee for Chemistry **(Czech Republic)**
Det Kongelige Danske Videnskabernes Selskab **(Denmark)**
Deutscher Zentralausschuss für Chemie **(Federal Republic of Germany)**
Suomen Kemian Seura **(Finland)**
Comité National Français de la Chimie **(France)**
Association of Greek Chemists **(Greece)**
Hungarian Academy of Sciences **(Hungary)**
Indian National Science Academy **(India)**
Royal Irish Academy **(Ireland)**
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Sociedade Portuguesa de Quimica **(Portugal)**
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Korean Chemical Society **(Republic of Korea)**
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Svenska Nationalkommittén för Kemi **(Sweden)**
Neue Schweizerisches Chemische Gesellschaft **(Switzerland)**
Royal Society **(United Kingdom)**
National Research Council, National Academy of Sciences **(USA)**
Union of Yugoslav Chemical Societies

Chemistry International

IUPAC

1998, Vol. 20, No. 1 (January)

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Information on this magazine can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

Blackwell Science

0193-6484(199801)20:1:1-J

Printed in Great Britain by Alden, Oxford

ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

Element	Name	Symbol
101	mendelevium	Md
102	nobelium	No
103	lawrencium	Lr
104	rutherfordium	Rf
105	dubnium	Db
106	seaborgium	Sg
107	bohrium	Bh
108	hassium	Hs
109	meitnerium	Mt

IUPAC

1998, Vol. 20, No. 2 (March)

Blackwell Science

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

PRODUCTION EDITOR: Howard Waller

All correspondence to be addressed to The Editor, Chemistry International, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Telephone: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org and http://www.iupac.org

Subscriptions

Six issues of *Chemistry International* will be published bimonthly in 1998 (one volume per annum) in January, March, May, July, September and November. The 1998 subscription rate including postage is GBP 75.00 (UK and overseas except North America) or USD 116.00 (US and Canada). The individual subscription rate is GBP 29.00 (UK and overseas except North America) or USD 42.00 (US and Canada). Microfiche subscriptions are available simultaneously with the printed edition, and microfilm at the end of the subscription year. Subscription orders may be placed directly with IUPAC's official publisher, Blackwell Science Ltd, PO Box 88, Oxford, UK; E-mail: journals.cs@blacksci.co.uk. Information on this journal can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

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Despatch. The news magazine is despatched within Europe by surface mail, to other continents by various forms of air-speeded delivery: to the US* by air freight for forwarding by periodicals post, to India by air freight for guaranteeed local delivery, and to all other countries by Accelerated Surface Post.

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Front cover: Names of the transfermium elements (see this issue, page 37).

International Union of Pure and Applied Chemistry

IUPAC adopts strategic plan

The Executive Committee on 23 February 1998 adopted a Strategic Plan for 1998–99 on behalf of the Bureau. Revisions to the plan will be considered each biennium. The text of the plan is available on the Union's web site (hyperlink http://www.iupac.org) in HTML format for direct viewing. It can also be downloaded in either word processing format (rich text) or Adobe Acrobat (PDF) format.

An implementation plan based on the Strategic Plan will be presented to the Bureau at its meeting on 26–27 September 1998 at Frankfurt a.M., Germany. After adoption, the implementation plan will also be distributed widely within the Union.

IUPAC strategic plan—1998

The International Union of Pure and Applied Chemistry (IUPAC) was formed in 1919 by chemists from industry and academia. Over nearly eight decades the Union has succeeded in fostering world-wide communications in the chemical sciences and in uniting chemistry—academic, industrial and government—in a common language. IUPAC has long been recognized as the world authority on chemical nomenclature, terminology, standardized methods for measurement, atomic weights and many other critically evaluated data. The Union continues to sponsor major international meetings that range from specialized scientific symposia to CHEMRAWN meetings with societal impact. During the Cold War, IUPAC became an important instrument for maintaining scientific and technical dialogue among the world's chemists.

With the major changes that have occurred world-wide in chemistry and the chemical industry, it is important that IUPAC examine its activities and define its role as the organization principally responsible for promotion of the chemical sciences internationally. Following a series of meetings to obtain input from leaders in chemistry on four continents, IUPAC has redefined its mission and established goals and strategies to guide its approach to the shaping of the chemical sciences and the service of chemistry in a rapidly changing world.

Mission statement

IUPAC's mission is to advance the world-wide aspects of the chemical sciences and to contribute to the application of chemistry in the service of mankind. In so doing, IUPAC promotes the norms, values, standards and ethics of science and advocates the free exchange of scientific information and unimpeded access of scientists to participation in activities related to the chemical sciences.*

Long range goals

To further its mission, IUPAC has established a set of long-range Goals and has formulated strategic thrusts that are aimed at achieving each of the Goals. The Goals are summarized here, and the complete set of Goals and Strategic Thrusts for the current biennium is given on the following pages.

1. IUPAC will serve as a scientific, international, non-governmental body in objectively addressing global issues involving the chemical sciences. Where appropriate, IUPAC will represent the interests of chemistry in governmental and non-governmental forums.
2. IUPAC will contribute to the advancement of research in the chemical sciences throughout the world.
3. IUPAC will assist chemistry related industry in its contributions to sustainable development, wealth creation and improvement in the quality of life.
4. IUPAC will facilitate the development of effective channels of communication in the international chemistry community.
5. IUPAC will promote the service of chemistry to society in both developed and developing countries.
6. IUPAC will utilize its global perspective to contribute toward the enhancement of education in chemistry and to advance the public understanding of chemistry and the scientific method.
7. IUPAC will make special efforts to encourage the career development of young chemists.
8. IUPAC will broaden the geographical base of the Union and insure that its human capital is drawn

*In recognition of the role of chemistry as a central science in a wide range of fields, the term 'chemical sciences' is used here to refer to chemistry, broadly defined, and to those disciplines and technologies that make significant use of chemistry.

from all segments of the world chemistry community.

9. IUPAC will encourage world-wide dissemination of information about the activities of the Union.
10. IUPAC will assure sound management of its resources to provide maximum value for the funds invested in the Union.

Goals and strategic thrusts—1998–1999

To further its mission, IUPAC has established a set of long-range Goals and has formulated strategic thrusts that are aimed at achieving each of these Goals. These strategies are intended to guide the development of operational plans and the setting of priorities for optimal use of the Union's resources, both human and financial.

1. IUPAC will serve as a scientific, international, non-governmental body in objectively addressing global issues involving the chemical sciences. Where appropriate, IUPAC will represent the interests of chemistry in governmental and non-governmental forums.

- IUPAC will conduct projects pertaining to the chemical aspects of important issues of international concern. In addition to projects initiated within IUPAC, input for new projects of scientific and industrial importance may come from international governmental and non-governmental bodies and from appropriate public groups. Examples are the series of CHEMRAWN conferences, the recent *White Book on Chlorine* and the studies of methods for disposal of chemical weapons. IUPAC will not undertake projects that cast it in the role of policy development or as an advocate for special interest groups.
- Collaborations with international governmental bodies, such as UNESCO and the World Health Organization, should continue and be strengthened. The IUPAC/UNESCO International Council for Chemistry will serve as the central forum for planning and coordinating work with UNESCO. Collaborations with other individual scientific Unions, with international scientific societies, and with the International Council of Scientific Unions (ICSU) should be enhanced to plan and carry out projects of an interdisciplinary nature.

2. IUPAC will contribute to the advancement of research in the chemical sciences throughout the world.

- The importance of standardized nomenclature, symbols, terminology and methodology is critical to communication in the chemical sciences. To remain the recognized international authority in this area, IUPAC must ensure that important problems are recognized and treated fairly and expeditiously. Collaborations with national and regional chemistry societies, with governmental bodies and with commercial information organizations should be augmented. Greater efforts should be made to encourage adoption of IUPAC recommendations through contacts with authors, editors and publishers.
- The biennial IUPAC Congress is intended to present the most outstanding relevant developments in modern chemistry and to inspire high research standards. Future Congresses should adhere to this principle.
- An assessment should be made of IUPAC sponsorship of specialized symposia in order to strengthen this well accepted program. New significant research fields in chemistry should be highlighted by the initiation of relevant high quality symposia.
- Special attention should be devoted to improving the quality of the Union's scientific publication program. Bibliometric analysis and other criteria can be used to assess the impact of IUPAC books and the journal Pure and Applied Chemistry. IUPAC should take advantage of advances in electronic publishing methods to ensure high quality publications that are disseminated in a rapid and cost-effective manner.
- Policies should be developed for IUPAC's role in the preparation and dissemination of critically evaluated databases, from atomic weights to thermodynamic and other chemical data.

3. IUPAC will assist chemistry related industry in its contributions to sustainable development, wealth creation and improvement in the quality of life.

- IUPAC is unique among the International Scientific Unions in including within its scope a large industrial base. IUPAC is often perceived as being oriented primarily toward academic institutions, but industry benefits equally from much of the Union's work in standardized symbols, nomenclature and terminology, as well as from critically evaluated data. Greater efforts should be made to demonstrate the ways in which IUPAC serves industrial needs directly and indirectly. In addition to the present links provided by the Committee on Chemistry and Industry, serious efforts are needed to engage leaders in the chemical industry and national and international industry associations in dialogue to explore ways in which IUPAC and industry can enhance mutually beneficial interactions.
- IUPAC should be particularly alert to projects that help develop the scientific basis for practices and procedures that protect society while encouraging responsible and sustainable development. Such projects may be initiated in the basic chemistry Divisions, as well as in the mission-oriented Divisions (Chemistry and the Environment, and Chemistry and Human Health).

4. IUPAC will facilitate the development of effective channels of communication in the international chemistry community.

- The vast potential of the Internet should be utilized to enhance information transfer between IUPAC and chemists in many countries. The Affiliate Member Program already provides a base, which should be expanded many-fold.
- *Chemistry International* should be developed as a forum for highlighting important problems and advances in chemistry and for discussion of science policy and global issues in chemistry.
- Increased efforts should be made to provide information on IUPAC activities and news about important matters of international chemistry to major scientific journals and national and regional chemistry news magazines, which routinely reach hundreds of thousands of chemists world-wide. Feedback should be encouraged.

5. IUPAC will promote the service of chemistry to society in both developed and developing countries.

- CHEMRAWN Conferences have long provided the principal mechanism for IUPAC to address issues that transcend pure science and have important socio-political aspects. Such Conferences should continue to be promoted, along with follow-up Future Action Programs.
- IUPAC bodies should continue to be alert to projects on matters of societal importance (e.g. chemical weapons disposal, environmental cleanup) that depend heavily on chemical sciences and technology.
- Within its limited funds, IUPAC should consider ways to foster chemistry in developing countries. In many instances, IUPAC's initiative and scientific expertise has been paired with outside funding sources (e.g. recent UNESCO-supported work in the least developed countries and the UNESCO/UNIDO/IUPAC program in chemical safety) to produce valuable results, and this model should be further elaborated.

6. IUPAC will utilize its global perspective to contribute toward the enhancement of education in chemistry and to advance the public understanding of chemistry and the scientific method.

- Scientists everywhere recognize the critical role played by formal and informal education at all levels, from kindergarten through graduate school, not only for future scientists but also for the general public. The problems associated with such educational programs are enormous. Educational systems, administration and curricula vary drastically by country, locality and individual school and teacher. IUPAC cannot hope to make an impact on detailed curricula or outreach activities in individual countries and localities, but it may be able to complement the efforts of national chemical societies and to coordinate exchange of information. IUPAC should examine carefully what long-range role it can realistically play in international science education and develop appropriate policies. Meanwhile, a number of specific activities can usefully be initiated or continued, as described below.
- The Committee on Teaching of Chemistry (CTC) has been effective in carrying out its program on exchange of information on teaching methods, equipment, etc. CTC should continue to serve as the focal point for IUPAC's programs in this area, but its programs should be broadened. In addition, IUPAC Divisions should be invited to develop complementary projects to enhance education at all levels and to coordinate them with CTC.
- IUPAC should cooperate in whatever ways are feasible with the major new program established by ICSU on Capacity Building in Science, which will endeavour to disseminate information on science teaching in primary schools and science education for the public.

7. IUPAC will make special efforts to encourage the career development of young chemists.

- It is apparent that the future development of the chemical sciences lies largely in the hands of the younger generation of scientists, who often encounter severe obstacles in an era of constrained resources. IUPAC should develop programs that are perceived by 'younger chemists' to be helpful to them and feasible for the Union to undertake within its resources. Young chemists from developing countries who return after advanced training elsewhere may benefit particularly from these programs and from exchange of information with IUPAC via the Internet.
- IUPAC should strongly encourage organizers of the IUPAC Congress and IUPAC-sponsored symposia to provide travel support for younger scientists and to include younger scientists among the invited lecturers.
- IUPAC Commissions and other bodies should make special efforts to recruit well qualified younger scientists for their projects. Several National Adhering Organizations (NAOs) now provide travel support for younger scientists to attend the General Assembly as Associate Members, National Representatives or Observers; other NAOs should be encouraged to follow this lead.

8. IUPAC will broaden the geographical base of the Union and insure that its human capital is drawn from all segments of the world chemistry community.

- The Union is taking active steps toward globalization of its activities with regional meetings and solicitation of input from the world's chemists.

- The 42 National Adhering Organizations and 14 Observer Organizations that currently comprise IUPAC are broadly distributed throughout the world, but there are several geographic regions with little or no representation in the Union and a number of countries with substantial academic and industrial developments in chemistry that do not adhere to the Union. IUPAC should encourage such countries to apply for membership. In addition, IUPAC should stimulate less developed countries to seek Observer status.
- The Union has long had a formal policy of 'fair geographical representation' among Elected Members of the Bureau and informally strives to obtain geographic diversity among IUPAC and Division Officers. While maintaining the focus on expertise, IUPAC's scientific bodies should make efforts to recruit younger chemists, women chemists and chemists from recently developed regions, including in some instances countries that are not yet full Members of the Union.

9. IUPAC will encourage world-wide dissemination of information about the activities of the Union.

- Much of the valuable work done by IUPAC bodies is published only in Pure and Applied Chemistry or in specialized books and journals. Although such formal and archival publication is essential, greater efforts should be made by individual IUPAC bodies, the Secretariat and the NAOs to disseminate this information as early and as widely as possible to the relevant scientific community. In many instances, high quality reports from symposia, workshops and Commission activities should be prepared not only as formal scientific publications but also as semipopular documents emphasizing applications. For topics that warrant attention in the popular scientific press, carefully drawn news releases are needed.
- Contacts with major national chemical societies, regional chemistry federations, industrial associations, and government/industry/university consortia should be expanded to ensure that these organizations are fully aware of IUPAC activities and can provide credit to the Union where its activities complement theirs.
- Improved two-way communication with NAOs concerning science policy, planning and implementation of projects and other activities is needed. Special efforts should be made to prepare suitable material describing IUPAC programs and accomplishments in a form that will assist NAOs in recruiting Company Associates.

10. IUPAC will assure sound management of its resources to provide maximum value for the funds invested in the Union.

- The Union can undertake its many activities only because of stable financial support from its National Adhering Organizations, which in turn usually obtain their resources from government and/or industrial sources. IUPAC has a continuing responsibility to demonstrate to its sponsors that all relevant management tools, including the use of modern information technology, are employed to maximize productivity in the administration of the Union.
- IUPAC should encourage philanthropic donations to the Union's endowment. With continued wise investment strategies that assure maximum return consistent with reasonable safety, the endowment and operating reserves will provide a continuing source of funding that augments and leverages the subscriptions from the NAOs.
- Although the purpose of the IUPAC publications program is the dissemination of scientific information, this program has for a number of years provided substantial income to help support IUPAC's other work. As the program is redirected in the era of electronic publishing, efforts should be made to continue to have publications as a source of funds, rather than a drain on the Union's resources.
- Officers of IUPAC bodies and the Secretariat should continue to be alert to possible sources of funds for specific projects from outside groups (e.g. UNESCO, ICSU, charitable foundations and industry) to augment the base funds provided by NAO subscriptions.

Implementation and updating of the strategic plan

The Strategic Plan is intended to articulate the scientific and operational policy of IUPAC, providing overall policy guidance to the IUPAC Divisions and Standing Committees for assistance in the development of coordinated programs to advance the Union's mission. This Plan should not impede or replace initiatives at all levels within the Union. The Council, Bureau and Executive Committee will formulate procedures for ensuring that operational programs will be drafted and resources allocated within the context of the Strategic Plan, that responsibilities will be assigned for implementation of programs, and that outcomes will be evaluated.

Each biennium the strategic thrusts will be analysed and updated as needed. The long-range goals may also be revised when appropriate, but probably on a longer time frame.

New IUPAC Web Site

The IUPAC Web Site (http://www.iupac.org) has been extensively revised and updated. Information on the officers of the Union, Council Actions, Press Releases, Commission Activities and much more is available. The site is now located at the Sunsite server at the University of North Carolina, Chapel Hill. This is a large server with high bandwidth access. The Royal Society of Chemistry plans to support a mirror site on their server. Future plans include inclusion of the full text of recommendations and reports from *Pure & Applied Chemistry* as well as provisional recommendations during the public comment period. Each issue of *Chemistry International* will be posted as soon as it is printed. Comments are welcome and should be sent to secretariat@iupac.org

Meeting of Presidents of regional chemical societies

Research Triangle Park, North Carolina, USA, 29–30 January 1998

Minutes

Attendees

Prof. J. Jortner, President, International Union of Pure and Applied Chemistry
Prof. L. Niinistö, President, Federation of European Chemical Societies
Prof. H. Ohtaki, President, Federation of Asian Chemical Societies
Prof. B. Rivas, President, Federación Latinoamericana de Asociaciones Químicas
Prof. P.H.L. Walter, President, American Chemical Society
Prof. L. Weiler, President, Canadian Society for Chemistry
Dr D.H.M. Bowen, Former Chairman of IUPAC Committee on Print & Electronic Publications
Dr J. Malin, Administrator, International Activities, American Chemical Society
Prof. P. Reyes, General Secretary, Federación Latinoamericana de Asociaciones Químicas
Secretary: **Dr J.W. Jost**

1. Welcome and Introduction

Prof. Jortner extended a warm welcome to the Presidents of the Regional Chemical Societies at the first meeting of the group. He noted that this meeting was the first of its kind. The initiative for this meeting came from some of the Presidents of the regional Chemical Societies during the IUPAC Geneva Congress and General Assembly last August. IUPAC is honored to provide its good services to convene this important meeting. IUPAC represents and acts for the entire world chemistry community and the Presidents of the regional Chemical Societies represent almost the entire world of chemistry. We regret that Prof. Bekoe, the President of the African Association of Pure and Applied Chemistry, could not join us.

The purpose of the meeting was to share information and determine areas in which the group could cooperate. The agenda was intended to be flexible and lead to an open interchange of ideas. Each President gave a brief overview of his society's activities and areas of special interest or concern. Subsequently each President led the discussion on one of the Agenda topics.

2. Review of the activities of regional chemical societies

Prof. Rivas and Prof. Reyes presented the general aspects of financial support, publications, chemical education and PhD programs for the Societies that are members of FLAQ. It was noted that only two Journals published in Latin America are indexed in ISI, Anales de la Asociacion Química Argentina and Boletin de la Sociedad Chilena de Química. As an example of the situation in one member of FLAQ, Prof. Reyes described the economic and social environment in Chile. He noted the concern of the Chilean Chemical Society that fewer students were studying chemistry in secondary school or University. Some University degree programs are underutilized, graduating only a few advanced degree recipients each year. These concerns are shared by many of the other member societies of FLAQ.

Prof. Ohtaki reviewed the structure of FACS. FACS sponsors a conference each year. He described the dif-

ficulties in operating a regional society that includes an advanced industrial nation, Japan, whose chemists interact mainly with their counterparts in Europe and North America, and a number of developing nations whose chemical industry is small and underdeveloped.

Prof. Weiler noted that the Canadian Society has excellent relations with the ACS and cooperates closely with it. Some problems are unique to Canada. One current issue that is of concern is the move to license those who provide chemical services through groups other than chemical societies. This could lead to the situation where only engineers or certain kinds of other professionals could legally carry out certain activities which were traditionally done by chemists. This situation exists in other parts of the world, such as Europe, but seems to be moving further forward in Canada. The Society has only recently become aware that these licensing proposals could prevent chemists from practising in many traditional areas such as environmental analysis. Prof. Niinistö noted that similar actions are being contemplated in Europe as a result of the desire to set European Union-wide standards for chemists and other technical professionals.

Prof. Niinistö discussed the effects of the ongoing economic, social and political integration of the member states of the European Union. This has lead to the need for chemical societies to speak to the EU administrators in Brussels in addition to the ongoing discussions with governments at the national level. He also noted the consolidation of scientific publication, a topic he would address in more detail when the subject of cooperation in publications was discussed.

Prof. Walter reviewed the structure and function of the ACS. International activities involving education and the public understanding of science are centred in the International Activities Office. Recent important activity will be the Chemistry Week in 1999 during the ACS celebrations. Other important international activities focus on human Rights, the exchange of scientists and the donation of scientific material to developing countries. Prof. Walter noted that while each society focuses on national issues, many issues that seem to be national have an effect on chemists in other countries. He planned to address this issue in more detail when the agenda item on cooperation in legislative issues was discussed.

Prof. Jortner reviewed the current changes being discussed in the organization and management of IUPAC's scientific work.

Prof. Jortner emphasized four principles:

- Globalization of the Science and Technology Endeavour
- Interdisciplinary nature of scientific activities
- Expanding boundaries of the chemical sciences
- Mission-oriented service of chemistry

Prof. Jortner noted that IUPAC represents the global chemical science community, while the regional societies represent chemists in the national chemical societies. He then noted the meetings held by IUPAC to seek input from leaders of the chemical communities on the role of IUPAC. Meetings have already been held in North America, Europe and Asia, with meetings planned for Africa and Latin America later in 1998. He reviewed the membership of IUPAC, including the Company Associates and the Union's structure of Divisions and Commissions. Prof. Jortner pointed out disciplinary gaps, particularly for Material Science and Biomolecular Chemistry, and the difficulty of establishing interdisciplinary activities. He noted that the current funding of IUPAC projects is tied to people, Titular Members, not projects.

Prof. Jortner then briefly reviewed the charge of the Strategy Development and Implementation Committee and its membership. He reviewed the Goals the Committee had developed as the basis for the Union's strategy. The principles on which the Union's work are based are quality, relevance and global dimension. The next planned steps are to obtain approval of the Strategic Plan and its distribution, followed by its implementation.

Prof. Jortner discussed the 'Future Message of IUPAC', noting the importance of capacity building, the infrastructure of science, global communication and the commitment of the world's chemical societies to information transfer and global activities. Prof. Jortner concluded his remarks by noting that administrative changes are important but that new content is the most important. IUPAC needs and desires input from the global chemical community and in particular from this group.

3. Cooperation on legislative and governmental issues

Prof. Walter expanded on his earlier comments by noting that chemists work in a global environment. They often work for companies that do business in many parts of the world and must be able to practice in those countries. This is related directly to the issue raised by Prof. Weiler, of who controls the licensing of professionals who do chemistry. Chemistry is affected by legislation, environmental regulations and regulations controlling the licensing of drugs and agricultural chemicals have effects beyond national borders.

The issue of intellectual property also has global implications. This issue has also been dominated by nonchemists, often lawyers and the entertainment industry. The harmonization of patent and trademark regulations and the protection of patents and copyrights are issues of great importance to many chemists. The

protection of intellectual property and the preservation of the ability of academic researchers to use public domain information are often in conflict, with chemists concerned on both sides of the issue.

The group agreed that it was important for regional and national chemical societies to be aware of new laws and regulations in other parts of the world. The group agreed that a series of international workshops and seminars on chemical regulatory matters and risk/benefit analysis would be beneficial. Prof. Jortner volunteered the IUPAC Secretariat as a resource to act as a clearinghouse for this information, possibly by the use of the internet. A list server could be set up on the IUPAC web site to facilitate information exchange among those concerned with legislation and regulation in the regional and national societies.

4. Chemical education

Prof. Rivas opened the discussion of this topic by noting the differences in chemical education world-wide. Some countries would like information that helps them decide what are the 'best' centers for teacher training. He also noted the value of short stays by PhD students in advanced programs. This is often best done in places other than North America or Europe. He gave the example of Peruvian students spending part of a year doing research at a Chilean or Argentinean University.

Prof. Reyes emphasized the importance of sharing experiences on how to increase the enrollment of students in chemistry in high schools. He noted that the number of students in Chile studying chemistry is decreasing, while law, business, and medicine attract the brightest students.

Prof. Weiler commented that simply increasing the salaries of high school teachers is not the answer to improving chemistry education. He stressed the importance of setting requirements for chemistry teachers.

Prof. Jortner noted that chemistry can be viewed as the basis of a scientific education and agreed that international guidelines should be set for chemical education.

Prof. Walter observed that dissatisfaction with chemical education is 'global'. The students in all of the countries represented at this meeting compete globally. He proposed that the staff members responsible for chemical education at each society meet to discuss education standards. Prof. Jortner pointed out the possible value of a workshop on this issue.

Prof. Ohtaki noted that one possible area of cooperation is in the translation of textbooks into other languages.

The suggestion was made that a workshop could be organized to set the agenda for a CHEMRAWN Conference on Chemistry Education. Dr Malin agreed to organize the workshop.

5. Public understanding of science

Prof. Niinistö introduced this topic by noting that the ACS National Chemistry Week program seemed to be the kind of program other societies should institute. He asked the ACS representatives present how successful the program had been.

Dr Malin noted the importance of local section involvement. The program seems to bring chemistry to the attention of the public. The program has been built up over the years as local sections learn what works—and what doesn't—in bringing chemistry to the public. He pointed out that for the last two years National Chemistry Week had been featured on the Today TV program.

Prof. Weiler commented on the Canadian experience with National Chemistry Week by noting that academic chemists tend to do 'gee whiz' demonstrations that attract younger children while industrial chemists do programs that attract older children and adults.

6. Cooperation in publications

Prof. Weiler introduced the topic by describing some of the changes occurring in journal publication, in the means of submission, distribution and storage of information. He noted that we need to consider the proliferation of information. What is the role of the learned societies *vis-à-vis* commercial publishers? What is the role of international organizations? How do we evaluate the value of information?

Prof. Niinistö described the changes taking place in the European journal market. A number of national journals are being consolidated into three journals to be published for the national societies by Wiley-VCH. The journals of the Royal Society of Chemistry, those of the Elsevier Group and some journals by independent learned societies constitute the rest of the market, but consolidation and regrouping is also taking place. Thus, all European journals will be published by one of three large groups and a few small societies.

Prof. Walter commented that journals would continue to exist only as long as they provide added value. The new modes of electronic publication offer efficiencies in the distribution of information, but the low cost and ease of distribution of information on the web leads to a proliferation of unreviewed publications. There is still a need for the traditional functions of the peer-reviewed publication, the issue is how to charge for that function. He also noted that the new environment of the world-wide web had undetermined implications for secondary and tertiary publications such as *Chemical Abstracts*.

The group concluded that there was no obvious need for a cooperation forum or mechanism in the publications area.

7. Cooperation in membership

Prof. Ohtaki noted that IUPAC must expand its membership to include Asian and African Societies. Prof. Jortner described the steps that IUPAC was taking to recruit more of these societies into the Union. Prof. Walter commented that demonstrating the value of membership was the key issue.

Discussion of this topic had to be cut short due to a lack of time, despite its interest.

8. Conclusions

Prof. Jortner reviewed the main points of the discussions, the need to cooperate on education issues, the public image of chemistry and global chemical legislation and government issues. Prof. Jortner pointed out that the role of IUPAC in regional collaboration will be:

- Catalysis of regional collaboration
- Supplement regional collaboration by global international activities
- Assistance in information flow
- Enhance (but not mediate) direct interregional interaction

The participants agreed that the meeting had been extremely useful. The group will meet again at the occasion of the IUPAC General Assembly (at Berlin in 1999). The time and location of meetings in the non-General Assembly years will be determined at a later date.

The transition of the chemical industry

Dr Hans K. Jucker, former Chairman of the Board of Alusuisse-Lonza Holding, Ltd

Presented to the Meeting of Chemical Society Presidents held in conjunction with the IUPAC Congress and General Assembly, Geneva Switzerland, 21 August 1997

Introduction

The global Chemical Industry is in transition from a structure that has existed since the beginning of the post-war era. This structure was characterized by the dominance of large integrated petrochemical companies and large mixed product 'classical' chemical companies. The new structure will be dominated by large life science companies and smaller R&D driven companies

The transition of the chemical industry

1980	2010
Integrated Petrochemical companies 'the big 9'	Large Life Science companies
Large mixed product chemical companies 'classical'	Small to medium specialized companies
Specialty chemical companies	Emerging R&D driven companies
Small chemcial companies	'Me too' companies for isolated/protected markets
Sate owned chemical companies	Medium supplIers to the 'outsourceers'
	Large basic chemical companies

Fig. 1 The transition of the chemical industry

Dr Hans K. Jucker

besides the often state-owned petrochemical complexes. This transition is shown schematically in Fig. 1. R&D will be a significant factor in the prosperity of most of the organizations competing in this new environment. R&D has been an important factor for chemical companies since the creation of the first chemical companies in the 19th century. The qualitative difference in this new phase that the chemical industry is entering, is the prevalence of interdisciplinary team-based research. It is this change in the nature of R&D in the chemical industry that I would like to discuss.

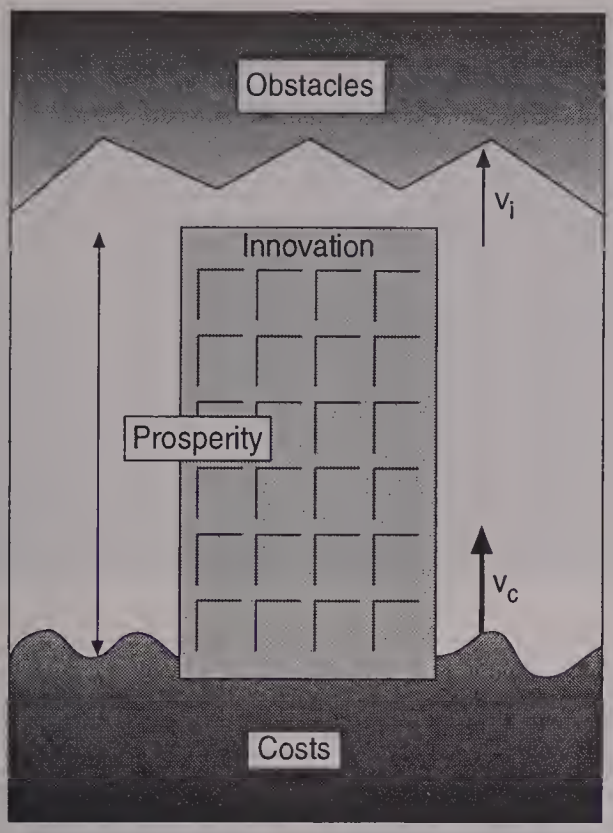

Fig. 2

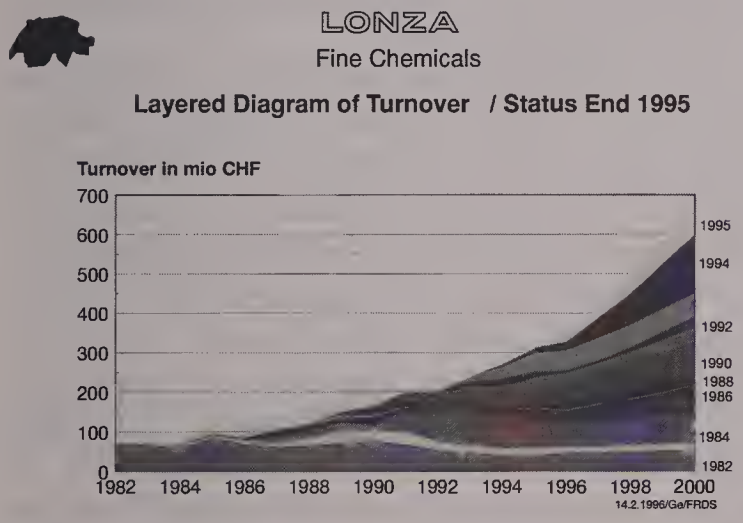

Fig. 3

The role of innovation

Figure 2 shows a building which represents a chemical company, or for that matter, any other enterprise in a modern economy. The building is slowly being flooded from below. The inhabitants must build new floors on top to maintain or increase the number of habitable floors. The number of habitable floors is a measure of the prosperity of the organization or society. The rising water level represents the increase in costs of the firm's activities. The rate of increase of costs is represented as v_c, while v_i represents the rate of innovation. It is by innovation that new floors are added to the building. Much of the activity of the past decade has been focussed on reducing v_c. The sustainability equation for the system therefore being $v_i > v_c$. Figure 3 shows the proportion of the current turnover of a member of the Alusuisse-Lonza Group from products developed since 1982. LONZA is a typical example of a high-tech, medium sized chemical corporation.

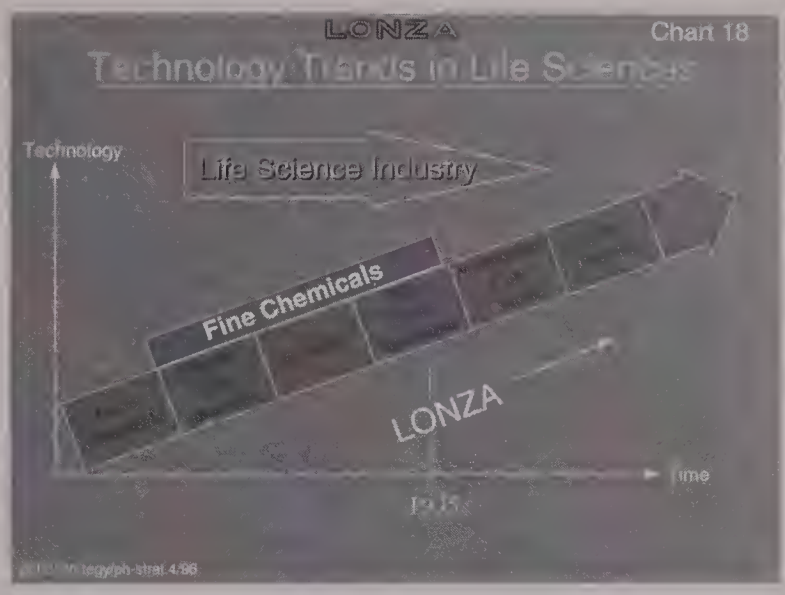

Fig. 4

The same point can be made in a different way by considering Fig. 4. The nature of the technology employed by LONZA has changed, from the origins of the company in basic chemicals, to its evolution into a fine chemicals company, to its expected future as a company based on biotransformations and gene therapy. Let us take as an example the LONZA plant in Visp (in the Valaisan alps, not far from Geneva) In this connection, we can note that the number of LONZA employees with technical degrees has increased from less than 200 in 1980 to over 300 in 1997, while the number of other employees has changed very little. Increasing from slightly more than 2200 to slightly less than 2400.

The innovation process

Since I believe we are entering a period where innovation will be a key success factor for the chemical industry, I would like to discuss the Innovation Process. This is a process that has many myths associated with it. Figure 5 is a diagram illustrating one of those myths, the myth of the linear progression from problem generation to result. The mythological nature of this linear process

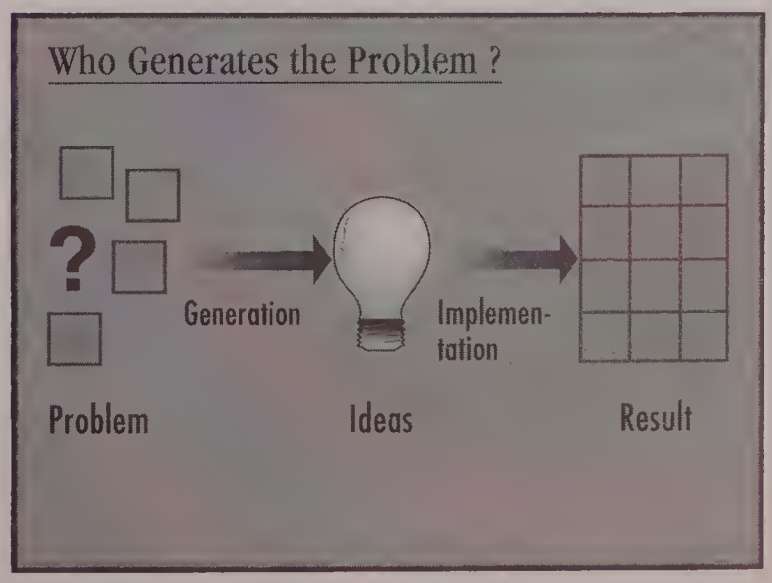

Fig. 5 Who generates the problem?

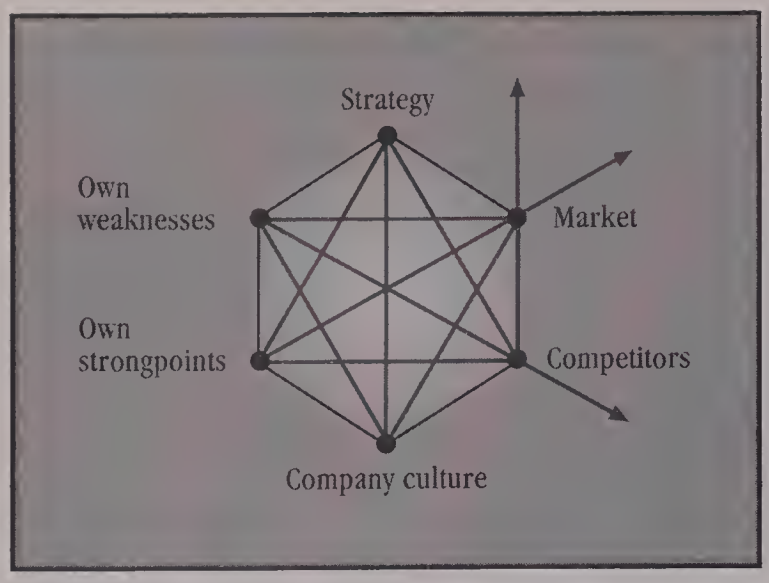

Fig. 6

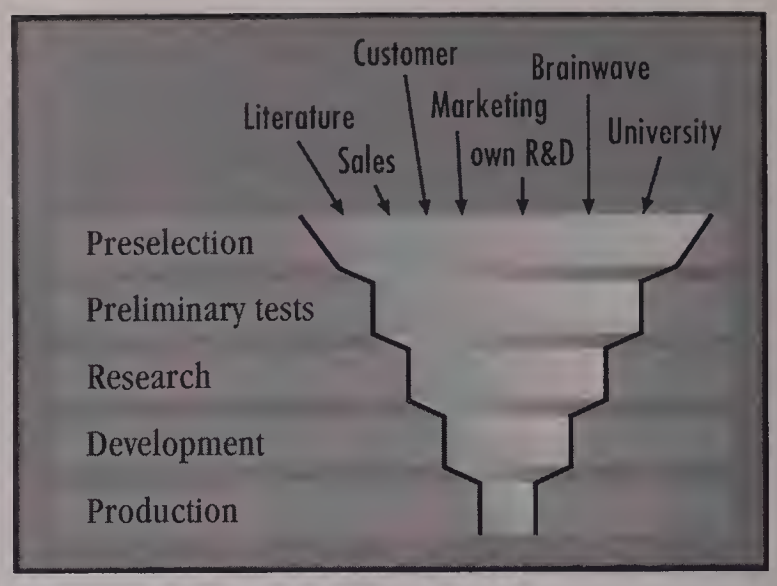

Fig. 7

lies not only in the lack of feedback loops and its neglect of what could be called the cultural aspects of innovation, but chiefly in the assumption that the problems are all around us. I would like to make the case that we have a highly advanced problem-solving system in our research laboratories, but a primitive problem selection process. The mindless application of this problem solving ability to problems of low value leads to the situation summarized in the following bit of folk wisdom: 'It is easier to make research from money than money from research.'

Figure 6 is a depiction of the morphology of the problem finding process. The complexity of the diagram reminds us that this process is still one of judgement rather than a mechanical one that can be applied by formula.

Project evaluation

The quality of a project can be represented by the following equation:

$$Q = M \cdot F \cdot L \cdot [a + b + c \ldots]$$

M: Market 'Why does customer X order quantity *q* for price *y*?'
F: Financial 'Can we afford it?'
L: Legal 'Will it be allowed?'

If any of the dominant factors, *M*, *F* or *L*, is zero the whole equation is zero. Each of these factors can be influenced, as can the qualifications *a*, *b*, *c*. The latter are factors such as: can we produce it?, is our R&D competitive?, is there a patent problem?, etc. This is, of course, not simple mathematics. Most of the problems of life do not follow classic mechanics, but rather the mathematics of fractals. The issue of the time horizon of projects is an important one. Two statements can be made on this subject:

- Most industrial corporations die, if they have only short-term goals
- Most well established and wealthy corporations, who generally foster and subsidize only long-term projects, die as well.

It is not easy to find a reasonable and affordable mix of long and short-term projects.

I have emphasized the importance of finding new project ideas. Figure 7 depicts the classic notion of product development. A continuous and large flow of new ideas from within and without the corporation is pre-selected, tested, gone through R&D and finally 1 or 5% reach the stages of production and sales.* Figure 8 shows an all too common actual inverted funnel. Because of a permanent demand for funds, the R&D capacity has expanded—but there are no really good project ideas (especially for government-funded research). How do people feel in this system? They are generally very busy—most even medium-happy. Except the real innovators, who quit. However, the rest organize, structurize, administrate, write reports—and ask for higher salaries. Not many brilliant ideas reach the relatively large laboratories. Too many risky, too

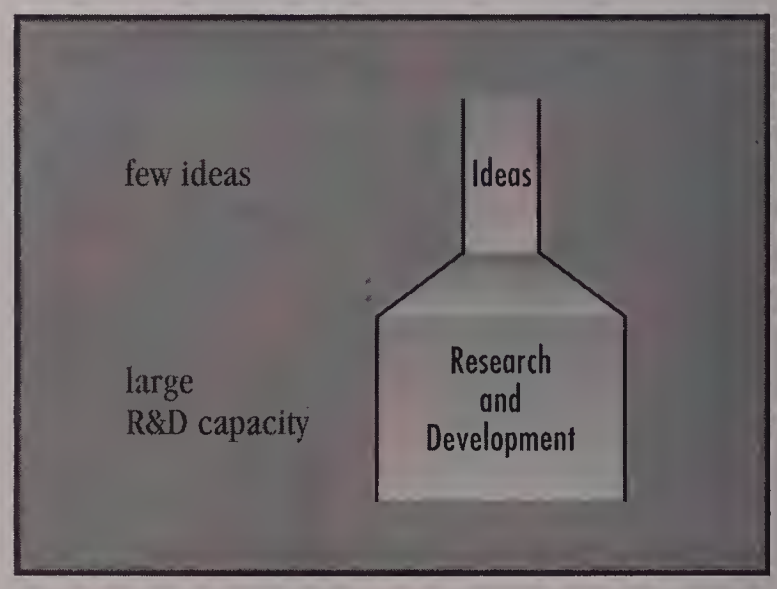

Fig. 8

*In a life science chemical company more probably 0.1 to 0.01%.

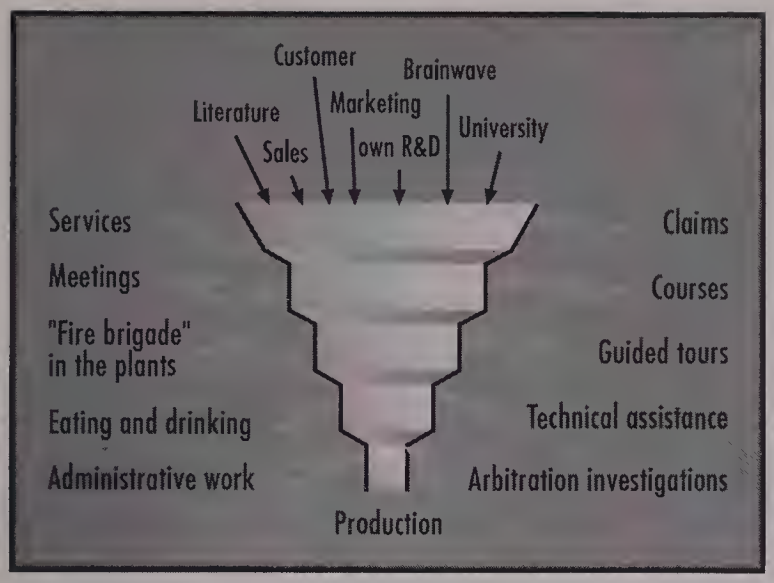

Fig. 9

Elements of a well-organized and orderly R&D System

- Motivated co-workers
- An expedient organization
- A clearly structured project procedure
- Interdisciplinary teams
- A functioning infrastructure
- Permanent education
- Project leaders

Fig. 10 Elements of a well-organized and orderly R&D system.

long-term or even silly ideas have to be pursued, and spoil even the reputation of excellent R&D. The major and most difficult question, 'what should we invent?' remains unanswered, the 'how to invent' is now a widespread art in most laboratories. The methodology of idea generation remains the important question.

Interference Centers

- "Project Champions"
- Emergency situations, stress
- Lack of work, boredom
- Contacts over sector boundaries
- Coffee table conversations
- "Playcorners" for researchers
- Customer contacts

Fig. 11 Interference Centers.

Creating an innovative climate

Another funnel, shown in Figure 9, describes the activities of many large laboratories. The wonderful capacity of an R&D organization is eaten up by paper production, red tape, controlling, and a lot of other nonsense. Instead of new products and new production processes, we get paper, brochures and presentations. The real yield drifts to almost zero. From this we may conclude that the best people, the best laboratories and the best organization alone do not mean a creative and productive atmosphere. Figure 10 shows the elements of a well-organized R&D system. This is a wonderful system, but it doesn't work. An organization always has to be challenged, shaken up. I would like to call this interference centers (Fig. 11).

Chaos has been proposed as the real type of organization, but all experiments show that it does not work either. We need clean laboratories, precise analysis, glass-clear analysis and precise recording. This leads to the conclusion that only the interference of a dual system, well-organized and orderly R&D and interference centers (chaos) lead to results.

What does Industry need from the State?

1. **A good high school education**
2. **University education**
3. **Permanent education**
4. **University Research**
5. **Research, development, education at the 'infrastructural boundaries'**
6. **Top level research in selected crucial sectors**
7. **Applied research and evelopment at engineering schools**
8. **Providing a helping hand with regard to technology transfer to smaller and medium-sized enterprises**
9. **An innovative climate**

Fig. 12 What does industry need from the state?

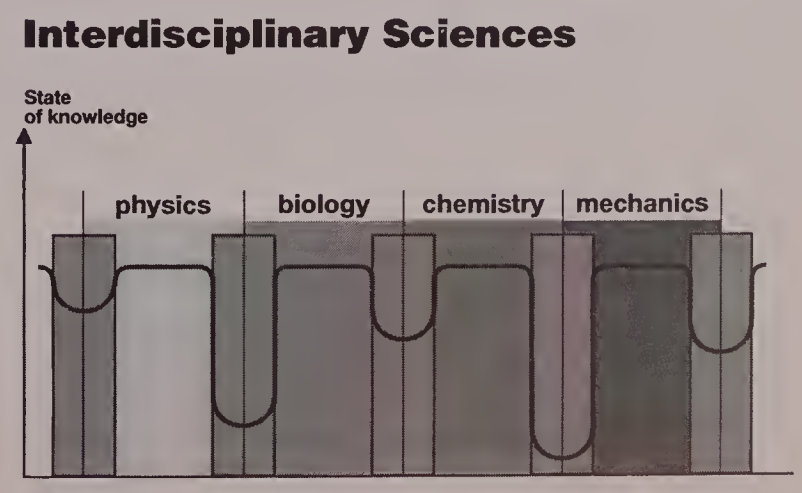

Fig. 13 Interdisciplinary Sciences.

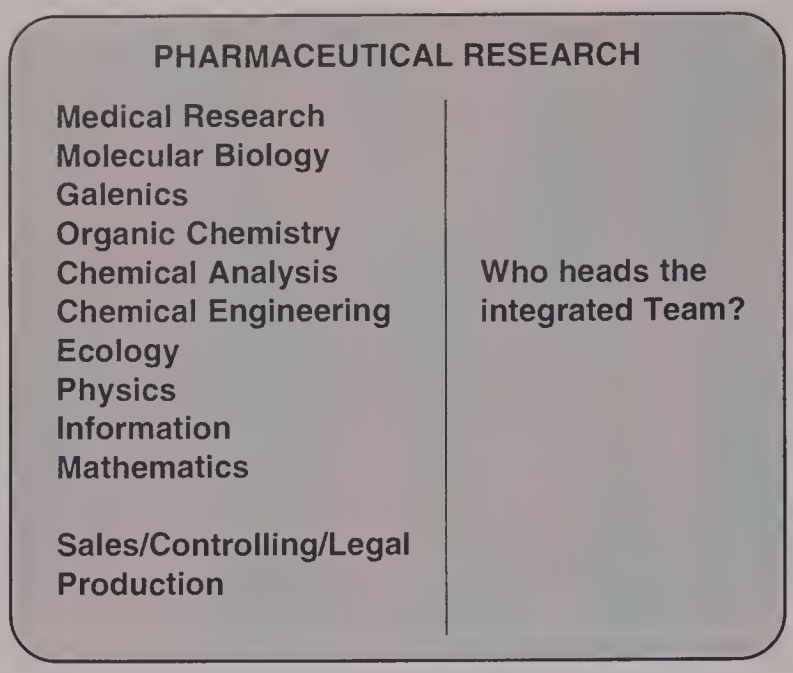

Fig. 14 Pharmaceutical research.

'Ideas for innovation and inventions are conceived at the centers of interference in a well-organized and structured research and development apparatus.'

What does industry need from the state?

Figure 12 lists those things that the state can do to support industry. As you can see, these are not direct support, but rather the development of human capital and the facilitation certain kinds of technology development and technology transfer.

Interdisciplinary Sciences

Future developments will more often take place at the interfaces of traditional disciplines. Figure 13 shows, in a schematic way, the state of knowledge about those interfaces. The interface of biology and chemistry is well developed, while the interfaces between physics and biology and chemistry and mechanics are relatively underdeveloped. As a practical example of the reality of interdisciplinary research, we can look at the disciplines needed to conduct pharmaceutical research. Figure 14 is a list, which is probably incomplete, of the members of the ideal Pharmaceutical Research team. One essential question, *who* heads the integrated team?

Shareholder value

I would like to return to the question implicitly raised at the beginning of this discussion. What constitutes shareholder value? This is a topic that can generate more heat than light. I would like to pose it in a slightly different way. How does a company generate shareholder value? Most business leaders would talk about providing a good (excellent) return on investment. That is, in my view, a result. How does the company accomplish this? Figure 15 is another conceptual equation to show what I propose are the necessary components for the creation of shareholder value. If these three factors can be optimized, shareholder value will be optimized. You will note that a return on investment does not appear in this equation. Economical results are derived from customer satisfaction, which can only be achieved through employee motivation and service to the community.

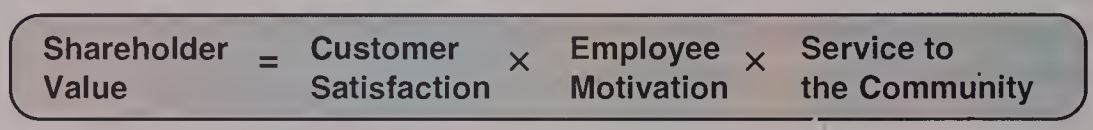

Fig. 15

Meeting reports

ComTox. Commission on Toxicology (VII.4)

Unconfirmed Minutes of the Commission Meeting. Geneva, IUPAC General Assembly. 23–26 August 1997.

Minutes prepared by: Birger Heinzow and Rita Cornelis.

Dr John Duffus reported about the International Seminar on Assessment of Carcinogenic Risk from Occupational Exposure to Inorganic Substances, Luxembourg, 17–20 October 1995. The publication of the proceedings is now being organized by the Royal Society of Chemistry and will be published later this year.

Recommendations for the biological monitoring of VOCs

Coordinators: Drs Jakubowski, Regine Heinrich-Ramm

and Heinzow.

A revised and shortened draft, prepared by Dr Heinrich-Ramm and Dr Heinzow, was presented and discussed within the working party. As the outcome of the fruitful discussion, specific tasks were assigned and will be sent to Dr Heinrich-Ramm by the end of September.

A further meeting was regarded as necessary for the final discussion. It was proposed that the meeting of the members of the working party be on 21–23 November 1997. Funding was requested from the Division. (Participants: Drs Aitio, Jakubowski, Molin Christensen, Heinzow, Olsen and Heinrich-Ramm).

Calculation and application of coverage intervals for biological reference values

The manuscript prepared by O.E. Poulsen, E. Holst, J.M. Christensen has been published in PAC as a technical report (*Pure Appl. Chem.* 1997, **69**, 1601-1611). A computer program will be made available by Dr Christensen upon request.

Decision rules in compliance testing for implementation of exposure limits

Coordinator: Dr J.M. Christensen and E. Olsen

A revised version focusing on human health was circulated by Dr Christensen. Additional input was obtained from the ISO. The project will be completed by 1999.

Risk assessment group

Working group: Drs Duffus, J.M. Christensen, E. Olsen and R. Herber

A first meeting of the exploratory working party was held in Amsterdam in 1996 and in 1997 in Stockholm. The problems of terminology were discussed.

Dr Duffus has prepared a first draft for teaching risk assessment. The project will mainly focus on the occupational environment and will be prepared as educational material.

Dr Duffus proposed as an additional project: risk assessment for inhalation of particulate matter (especially for metal). International input for the working party (e.g.) Fraunhofer Inst. Hannover (D) will be established.

The Commission recommended these proposals to become projects for the next two year. Cooperation with ICPS will be sought and was welcomed by Dr Mercier, director of IPCS.

Recommendations for exposure assessment using a logbook method.

Coordinator: E. Olsen

Erik Olsen reported that the logbook project will be based on papers circulated previously. He gave a report on the basic methodology. Dr Rappaport is a co-worker. The paper will be revised soon.

Combined effects of drugs and toxic agents. Recommendations for study design, methods, evaluation and nomenclature.

Coordinators: Drs G. Poech and B. Heinzow

Dr Heinzow outlined the status of the project. A first draft has been presented by Dr Poech. The approach to use dose–response curves as the basis for a description of combined effects was supported. Examples should be given, a software package is available by Dr Poech. The project will be completed within the next two years.

A new project presented by O. Hertel (DK): Modelling of human exposure to outdoor air pollution, was accepted by the commission. It was recommended to include practical examples. A computer program will possibly be made available for use of exposure assessment. This activity was received with great interest also by Dr Mecier (IPCS). Co-operation with Division VI (Chemistry and the Environment), Commission on Atmospheric Chemistry, was established.

Cooperation within IUPAC

Analytical Chemistry Division, Commission on Microchemical Techniques and Trace Analysis, Division VI, Chemistry and the Environment, Commission on Fundamental Environmental Chemistry, and Division VII Chemistry and Human health, Commission on Toxicology.

Dr Cornelis and Dr Templeton represented ComTox. Working definitions on speciation were agreed upon and distributed. A manuscript: 'Terms related to speciation of trace elements' following the results of the discussion in Guildford and Ispra is under preparation.

A document co-ordinated by Dr Cornelis should be ready by November

Future co-operation on the project: 'Speciation analysis of biomolecules by hyphenated techniques' is planned with V.C2. Co-ordinator is Dr Ryszard Lobinski.

Future co-operation with CTC may focus on educational programs on toxicology for chemistry students and for school teachers

It was recommended that an abbreviated version of the textbook on Toxicology be prepared and a curriculum for a training course for chemists and chemistry school teachers on Toxicology be developed. It was recommended that questions and answers put forward most often to school teachers by students and the public be included.

Project: Abbreviated textbook: 'Introduction to toxicology'
Coordinator: Dr Duffus and Dr Worth; B. Heinzow, R. Herber, J. M. Christensen, D. Templeton. Co-operation will be sought with WHO.

Committee on Quantities and Units
The manuscript: 'Properties and Units in the clinical laboratory sciences, XI. Properties and Units in Trace Elements', by Rita Cornelis, X. Fuentes, I. Brunshuis and D. Templeton was finalised and will be published in *PAC*, *Clin. Chim. Acta* and *Eur. J. Clin. Chem. Clin. Biochem.*

A new project: 'Metrological nomenclature in toxicology' will be co-ordinated by Drs X. Fuentes, R. Cornelis and J. M. Christensen.

Co-operation and exchange of expertise will continue
Contacts were established to the Chemistry and the Environment Division, Commission on Food Chemistry. Possible projects and future topics were presented by Dr Elke Anklam, M. Miraglia and C. Brera.

As a possible joint project: 'Review of endocrine disruptors in foodstuff and its health implications' was agreed. This project might also become part of the planned White Book on Endocrine Disruptors. This matter will be discussed within the Divisions, whether to include the project as a chapter in the white book or to initiate a separate project.

A discussion on metals in food was initiated and Dr Templeton will contact Dr Szteke (PL).

Cooperation with other scientific bodies

Cooperation with WHO and IPCS on risk assessment will continue and be intensified. It was recommended that Dr Cornelis be nominated as liaison to IPCS. Dr Mercier attended the Commission meeting and gave an overview of IPCS activities. The input by ComTox was very much welcomed and the discussion for a training course on toxicology will be further explored.

Next meeting of the commission

The next venue will be in Edinburgh in September 1998. Dr Duffus will be the local organizer.

Summary of the minutes of the meeting of the Commission on Molecular Structure and Spectroscopy (I.5) at the IUPAC General Assembly, Geneva, Switzerland 24–27 August 1997

Fifteen members of the Commission on Molecular Structure and Spectroscopy (I.5), including national representatives and observers, met for three days of hard work during the 39th General Assembly in Geneva, Switzerland, with little time for admiring the beautiful setting on the Lac Leman and the famous Geneva fountain. Three new Titular Members, Robin S. McDowell, Noboru Hirota and James E. Boggs, and three Associate Members, Soji Tsuchiya, Qing-Shi Zhu and Paul von Rague Schleyer were elected to the Commission. Four new national Representatives were appointed, Profs P.T. Manoharan (India), J.P. Hawranek (Poland), B.J. Van der Veken (Belgium), and R. Janoschek (Austria).

Several projects were completed and the results published in *Pure Appl. Chem.* (PAC): C.L. Wilkins, *Guidelines on Nuclear Magnetic Resonance Computerized Databases,* PAC 1995, **67**, 593; A.M. Bradshaw and N.V. Richardson, *Symmetry, Selection Rules and Nomenclature in Surface Spectroscopy*, PAC 1996, **68**, 457; G. Guelachvili and 23 collaborators., *High Resolution Wavenumber Standards for the Infrared*, PAC 1996, **68**, 193, and this paper was also reprinted in *J. Molec. Spectrosc.* 1996, **177**, 164 and *Spectrochim. Acta* 1996, **52**, 717; C.J.H. Schutte, J.E. Bertie, P.R. Bunker, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, *Notations and Conventions in Molecular Spectroscopy part 1. General Spectroscopic Notation*, PAC 1997, **69**, 1633; C.J.H. Schutte, J.E. Bertie, P.R. Bunker, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, *Notations and Conventions in Molecular Spectroscopy part 2. Symmetry Notation*, PAC 1997, **69**, 164; P.R. Bunker, C.J.H. Schutte, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, *Notations and Conventions in Molecular Spectroscopy part 3. Permutation and Permutation-Inversion Symmetry Notation*, PAC 1997, **69**, 1651.

The following book has been published: J.E. Bertie, C.D. Keefe and R.N. Jones, *Tables of Intensities for the Calibration of Infrared Spectroscopic Measurements in the Liquid Phase*, 263 pp., Blackwell, 1995. A joint article from Commissions I.5 and V.4 describing the work in the two commissions has been published in Applied Spectroscopy 1996, **50**, 12A: J.E. Bertie and T. Vo-Dinh, *Spectroscopy Commissions of the International Union of Pure and Applied Chemistry.*

Other articles were, in press or the projects were very close to completion: R.K. Harris, J. Kowalewski and S. Cabral de Menezes, *Parameters and Symbols for Use in Nuclear Magnetic Resonance*, PAC, in press; E.D. Becker, W. Bremser, S. Cabral de Menezes, R. Goodfellow, P. Granger and R.K. Harris, *Recommendations for NMR Nomenclature A. Nuclear Spin Properties and Conventions for Chemical Shifts;* and J.E. Bertie, *Specification of Components, Methods and Parameters in Fourier Transform Spectroscopy by Michelson and Related Interferometers*. The latter paper has been divided into one part for modest resolution spectroscopy

(0.1 cm^{-1} or less) and one for high resolution spectroscopy (10^{-3} cm^{-1} or better). In addition, a part pertaining to FT-Raman spectroscopy is included. The following manuscript of a book was approved in Geneva: E. Hirota, R.W. Field, J.P. Maier and S. Tsuchiya, editors, *Non-linear Spectroscopy for Molecular Structure Determination*. It constitutes a monograph of 268 pages and 10 chapters, probably suitable both for teaching and as a reference book to nonlinear spectroscopy. The book will be published by Blackwell early in 1998.

Projects from the Sub-Committee on Theoretical Chemistry are in progress: *Guidelines for Presentation of Methodological Choices in the Publication of Computational Results, A. ab initio Electronic Structure Calculations* (Project leader J.E. Boggs). The paper was approved by the Commission for immediate publication. A draft for semiempirical calculations is in progress (part B) and should be completed in two years. A third paper (part C) is planned to deal with computation of large molecules by molecular mechanics. An extensive report comprising 194 compounds was presented to the Commission for discussion and suggestion: R. Janoschek, *The Quantum Chemical Computation of Structures and Properties of Small Experimentally Known Molecules I. Diatomic Molecules for H-Ar.* It was agreed that the project would be completed following consultations with an international group of specialists.

Various new projects were initiated: *Notations and Conventions in Molecular Spectroscopy. Part 4. Vibrational-Rotational Spectroscopy* (Project leaders R.S. McDowell and J.K.G. Watson); *Notations and Conventions in Molecular Spectroscopy. Part 5. Electronic-Vibrational-Rotational Spectroscopy* (Project leaders J.K.G. Watson and R.S. McDowell). The Commission approved both these projects. Another proposed project was also approved: *Quantities, Terminology and Symbols in Photothermal and Related Spectroscopies* (Project leaders N. Hirota and M. Terazima); these methods are very sensitive and of increasing importance in applied science. R.K. Harris successfully sought approval-in-principle for a project to recommend *Nomenclature for tensor quantities used in NMR, NQR and ESR Spectroscopies* (Project leader R.K. Harris); formal IUPAC approval for this project will be sought when the working party members have been recruited and the goals have been more precisely formulated.

Joint meetings were held between Commission I.5 and three other commissions: Commission V.4 (Commission on Spectrochemical and Other Optical Procedures for Analysis) of the Analytical Division; Commission I.3 (Commission on Electrochemistry) and Commission I.1 (Physicochemical Symbols, Terminology and Units). With each of these commissions various projects of common interests were discussed. These joint meetings are very important to avoid overlap between projects of different commissions and to provide stimulation for joint projects of greater breadth than is usually achieved by a single commission. In particular, the meetings in Geneva gave good ideas to both parties about new proposals and cooperation on existing projects. With Commission I.1 it was agreed on additions and alterations which should be included in the next edition of The Green Book (Quantities, Units and Symbols in Physical Chemistry).

Theoretical chemistry plays an ever increasing role in chemistry and the Subcommittee on Theoretical Chemistry; which was established at the General Assembly in Guildford, continues with its chairman Professor James E. Boggs. The subcommittee is strengthened with five new members. The Subcommittee on Notations and Conventions for Molecular Spectroscopy has a new chairman Dr J.K.G. Watson, and Dr Robin S. McDowell and Professor Jean-Marie Flaud will join the subcommittee.

The commission discussed the use of the World-wide Web and it was suggested that a Home Page be established. However, no decision was made concerning the content and who should be responsible for the Web site.

The chairman, John E. Bertie, expressed his thanks to the outgoing members for their contributions to the work of Commission I.5 and looked forward seeing the members at the next IUPAC General Assembly to be held in Berlin in August 1999.

Peter Klaeboe
(Secretary of Commission I.5)

Latin American Workshop on Mycotoxins—methods of analysis

Food Chemistry Commission WPAC project: 650/88/96
(Working Group: Mycotoxins)
Coordinator(s): M. Sabino (local), J. Gilbert, E. Sydenham and H. van Egmond

This workshop was held in Sãn Paulo (Brazil) at the Instituto Adolfo Lutz, from 18 to 22 November 1996. Dr Myma Sabino was responsible for the local organization. The workshop was sponsored by ILSI Brazil, FAPESP, Instituto Adolfo Lutz and IUPAC. Additional funding was provided by industry. Eighty participants from four South American countries attended the workshop.

The workshop was aimed at providing training through a series of lectures from invited experts and through open discussion sessions covering methods of analysis for aflatoxins, ochratoxin A, zearalenone, patulin, trichothecenes and finnonisins. There were also a number of presentations on activities in the field of mycotoxins by participants from South America.

The workshop was evaluated by participants and

judged to have been successful and contributing strongly to spreading the IUPAC mission in the region. The success of this Workshop encouraged the organizers to bid to host the Xth IUPAC Symposium on Mycotoxins and Phycotoxins. The bid was successful, the conference will be held in Sãn Paulo, Brazil, 22–25 May 2000.

IUPAC CNOC—1997 Meeting—Summary

As part of the IUPAC 1997 General Assembly, the IUPAC Commission on Nomenclature of Organic Chemistry (Commission III.1—CNOC) met in Geneva, Switzerland for three full days, 24–26 August. Twenty-four people participated in some or all of the sessions. Most of the working time was spent on the P-names document, which was completed, except for editing, and adopted by the Commission. Other documents requiring only minor editing, at most, before submission to IDCNS or public review include:

- Phane Nomenclature. Part 1: Parent Hydride Names, Recommendations 1997. (Prepared for publication by W. H. Powell; O. Weissbach, coordinator.)
- Extension and Revision of the von Baeyer System for Naming Polycyclic Compounds (Including Bicyclic Compounds). (Prepared for publication by G. P. Moss.)
- Extension and Revision of the Nomenclature for Spiro Compounds. (Prepared for publication by G.P. Moss.)

Recommendations on fusion nomenclature [Nomenclature of Fused Ring and Bridged Fused Ring Systems, (Prepared for publication by G. P. Moss)] are scheduled for publication in *Pure and Applied Chemistry* in January 1998.

The Commission has now completed full review of points left pending in the *Guide*: namely, phane nomenclature (part 1), hydro/dehydro prefixes, and priority among classes of compounds. New substantive decisions on principles for the P-names document include:

(a) Seniority order for rings and ring systems.
(b) Seniority order for chains. This order includes <a> replacement names and a major change pertaining to compounds containing multiple carbon–carbon bonds. The longest continuous chain, with or without the multiple-bond linkage, is the parent chain.
(c) Alkyl vs. alkanyl style names. *Alkyl* will be used when the free valence (or point of attachment) is at a terminal position of the longest chain; *alkanyl* (with locant) will be used when the free valence (or point of attachment) is at a non-terminal position on the longest chain.
(d) Deletion of several previously retained (non-systematic) names, including isobutyl, sec-butyl, and phosgene.

No substantive decisions remain to be made by the Commission on any of its current projects, only editing of the documents before submission to IDCNS. For the next biennium, the Commission expects to work on four new projects:

1 Fullerene nomenclature
2 Stereochemistry: concepts, terms, notation.
3 Phane nomenclature, part II
4 Seniority based on CIP priorities

Prepared by James G. Traynharn, Secretary, CNOC

Meeting of the Commission on Physical Organic Chemistry in Geneva. From left to right: *Standing*—Prof. J.-L. Abboud, Prof. E. Humeres, Prof. E. Baciocchi, Dr J. R. Zdysiewicz, Prof. M. Tisler, Prof. S. Fukuwmi, Dr D. J. Raber, Prof. T. T. Tidwell, Prof. U. Sieffi, Prof. J. Shorter, Prof. S. S. Kim, Prof. R. Louw, Prof. V. I. Minkin, Prof. C. L. Perrin, Prof. P. Muller, Prof. Z. Rappoport; *Sitting*—Prof. P. Tundo, Prof. N. Nudelman, Prof. D. Lenoir, Prof. U. G. Edlund, Prof. M.-K. Ruasse, Prof. M. Oki, Prof. Y. Takeuchi.

Summary minutes of the meeting of the Commission on Physical Organic Chemistry (III.2), Geneva (Switzerland), 24–26 August 1997

The largest part of the meeting was devoted to the review of the status of the current projects as well as to the discussion of new projects. The Commission was pleased to find that the project *Critical Compilation of Scales of Medium Effects* can be considered finished and the project *Guidelines for Publication of Research Results from Empirical Force Field* is very close to the conclusion. The projects *Glossary of Terms Used in Theoretical Organic Chemistry* and *Glossary of Terms Used in Supramolecular Chemistry* are also well under way and their completion is expected within the next year.

Two new projects related to the environment were also discussed and approved. The first project *Reaction Pathways and Processes in Green Chemistry* was presented by Professor Tundo, the second, *Evaluation of Methods for Obtaining Physicochemical Properties of Environmentally Important Organic Compounds* by Professor Lenoir. Both projects are expected to be complete in two years. A feasibility study for a project concerning Gas-phase and Solution Data of Carbocations will be carried out by Professor Abboud. Continuing interest was shown for projects related to materials and education. A project on biomolecular mechanisms is also under consideration.

A joint meeting with the Commission of Photochemistry (III.3) was held on 25 August. In this meeting information was exchanged on the ongoing and future projects of the two Commissions. The possibility of a joint project was also considered.

Profound changes in the Commission Membership were recorded. Professor Tidwell will leave the Commission, having been nominated Secretary of the Organic Chemistry Division Committee. From January Ist, 1998, Professor C. Perrin will be the new Chairperson of the Commission. Professors Abboud and Ruasse were proposed as Titular Members of the Commission to replace Professors Shorter and Takeuchi (completed term of service). Professors Tundo and Lenoir were proposed as Associate Members.

Before concluding its work, the Commission wished to express the most grateful thanks to Professor Tidwell for his very efficient chairmanship and to Professors Shorter and Takeuchi for their numerous effective contribution to the Commission activity.

The next series of meetings of the Commission will be held in Florianópolis (Brazil) in the occasion of the 14th IUPAC Conference on Physical Organic Chemistry (16–21 August 1998).

Prof. T. T. Tidwell (Chair) and Prof E. Baciocchi (Secretary)

Recent reports

In this section we publish summaries of the most recent IUPAC recommedations on nomenclature and symbols and technical reports. The full texts of these recommendations and reports are published in *Pure & Appl. Chem.*

Erratum: IUPAC recommendations on nomenclature and symbols and technical reports from commissions

Commission on Agrochemicals and the Environment (N. K. J. Nflyamoto, G. D. Paulson, B. Zeeh, M. W. Skidmore, R. M. Hollingworth and H. A. Kuiper) Pesticides Report 37. Chirality in synthetic agrochemicals: Bioactivity and safety consideration (Technical Report) *Pure & Applied Chemistry* 1997, **69**(6), 1335–1348.

Due to a clerical error, Table 1 was omitted from this report. The report is reproduced in its entirety at the end of the September issue of *Pure & Applied Chemistry* 1997, **69**(9), 2007–2025.

Names and symbols of transfermium elements (IUPAC Recommendations 1997)

Synopsis: Revised recommendations for the names and symbols of the transfermium elements (atomic numbers 101–109) are presented along with the reasons for proposing them.

Introduction

The recommendations (ref. 1) of the Commission on Nomenclature of Inorganic Chemistry (CNIC) on the nomenclature of the transfermium elements (101–109, inclusive) were considered by the IUPAC Bureau at Guildford (UK) in September 1995. As a result of the various criticisms of the recommendations and the way

that they had been processed, the Bureau decided to adopt the recommendations as provisional and to circulate them to national/regional nomenclature centres in the normal way, with notices to be published in national/regional chemistry journals and magazines, requesting submission of comments to CNIC. In particular, the National Adhering Organizations (NAOs) were invited to express their views concerning the extant proposals for the names of these elements and the principles and traditions used to derive them. The response from the general chemical community was small, and the bulk of the replies came from nuclear scientists.

Recommendations

The Commission reconsidered all the names at a meeting in Chestertown, Maryland (USA) in August 1996. Although it is accepted that the discoverers of a new element have the right to propose a name and that such suggestions must receive serious consideration, it is also accepted that the final decision in such matters should be taken by CNIC, and ultimately confirmed by the Interdivisional Committee on Nomenclature and Symbols, Bureau, and Council of the Union. At Chestertown, CNIC reiterated its acceptance of the conclusions of the Transfermium Working Group (TWG) as a basis for taking decisions (refs. 2–4). However, it also decided to modify its decision that the name of a living scientist should not be used as the basis for an element name. The responses from the NA0s and the chemical community showed quite clearly that chemists in general do not regard this as an important issue and many thought it irrelevant. The Commission agreed, in keeping with tradition, to the use of appropriate names derived from (a) mythical concepts or characters, (b) place, area or country, (c) a property of the element, and (d) a scientist.

After some discussion CNIC agreed that elements 101, 102 and 103 should retain their commonly accepted names mendelevium, nobelium, and lawrencium. This is despite the fact that the original Swedish claim to have prepared element 102 was subsequently shown to have been in error by the Dubna laboratory, which finally achieved an undisputed synthesis. The discovery of element 106 by the Berkeley laboratory is uncontested and the name proposed by the discoverers, seaborgium, was accepted. The discoveries of elements 107 jointly by the Darmstadt and Dubna laboratories), and of 108 and 109 (by the Darmstadt laboratories) are also uncontested. The discoverers wished to call these nielsbohrium, hassium, and meitnerium, respectively, and the Commission accepted the last two. However, the proposal for 107 was the subject of vigorous debate. The name nielsbohrium is long and includes the first name of Niels Bohr as well as his family name. Such an element name is without precedent. Finally it was decided to refer the matter to the Danish NAO. Its preference for bohrium rather than nielsbohrium was ultimately accepted.

The discoveries of elements 104 and 105 are contested by Dubna and Berkeley. Both laboratories appear to have made significant contributions, but what has clearly emerged from the submissions, including those from Berkeley and from Darmstadt, is that the Dubna laboratory has played a key role in developing the experimental strategies used in synthesizing several transfermium elements. The Commission recommended that element 105 should be named dubnium in its honour. The Berkeley laboratory has already been similarly recognized on more than one occasion. Finally, the Commission accepted the name rutherfordium for element 104, to honour the New Zealand nuclear physicist, Emest Rutherford.

The agreed list of recommendations is as follows:

Element	Name	Symbol
101	mendelevium	Md
102	nobelium	No
103	lawrencium	Lr
104	rutherfordium	Rf
105	dubnium	Db
106	seaborgium	Sg
107	bohrium	Bh
108	hassium	Hs
109	meitnerium	Mt

The Commission benefited from the presence of a representative of the International Union of Pure and Applied Physics (IUPAP) at its meeting in Chestertown. It is to be hoped that such a person will always be available if needed, and the Commission believes that it will be important to revive a joint IUPAC–IUPAP Working Group to confirm the discovery of new elements and to adjudicate on competing claims for priority of discovery. The Commission hopes that the present collection of names will be accepted as a fair compromise between the various claims and suggestions. It recognizes important experimental and theoretical contributions to the discovery of new elements and also the international nature of our science.

References

1. *Pure Appl. Chem.* 1994, **66**, 2419–2421.
2. *Pure Appl. Chem.* 1991, **63**, 879–886.
3. *Pure Appl. Chem.* 1993, **65**, 1757–1763.
4. *Pure Appl. Chem.* 1993, **65**, 1764–1814.

This report was prepared for publication by the Commission on Nomenclature of Inorganic Chemistry, Inorganic Chemistry Division. The full details are to be found in Pure Appl. Chem. *1997, **69**, 2471–2473.*

Nomenclature of glycolipids (IUPAC Recommendations 1997)

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GL-7. Short abbreviations
- 7.1. Recommended abbreviations
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GL-1. General considerations

Glycolipids are glycosyl derivatives of lipids such as acylglycerols, ceramides and prenols. They are collectively part of a larger family of substances known as glycoconjugates. The major types of glycoconjugates are glycoproteins, glycopeptides, peptidoglycans, proteoglycans, glycolipids. and lipopolysaccharides. The structures of glycolipids are often complex and difficult to reproduce in the text of articles and certainly cannot be referred to in oral discussions without a nomenclature that implies specific chemical structural features.

The 1976 recommendations on lipid nomenclature contained a section (Lip-3) on glycolipids, with symbols and abbreviations as well as trivial names for some of the most commonly occurring glycolipids. Since then, more than 300 new glycolipids have been isolated and characterised some having carbohydrate chains with more than twenty monosaccharide residues and others with structural features such as inositol phosphate. The nomenclature needs to be convenient and practical, as well as extensible, to accommodate newly discovered structures. It should also be consistent with the nomenclature of glycoproteins, glycopeptides and peptidoglycans, oligosaccharides, and carbohydrates in general.

This document supersedes the glycolipid section in the 1976 Recommendations on lipid nomenclature.

This report was prepared for publication by M. Alan Chester (Blood Centre, University Hospital, S-221 85 Lund, Sweden), for the Joint Commission on Biochemical Nomenclature. The full details are to be found in Pure Appl. Chem. *1997,* ***69****, 2475–2487.*

Parameters and symbols for use in nuclear magnetic resonance (IUPAC Recommendations 1997)

Synopsis: NMR is now frequently the technique of choice for the determination of chemical structure in solution. Its uses also span structure in solids and mobility at the molecular level in all phases. The research literature in the subject is vast and ever-increasing. Unfortunately, many articles do not contain sufficient information for experiments to be repeated elsewhere, and there are many variations in the usage of symbols for the same physical quantity. It is the aim of the present recommendations to provide simple check-lists that will enable such problems to be minimised in a way that is consistent with general IUPAC formulation. The area of medical NMR and imaging is not specifically addressed in these recommendations, which are principally aimed at the mainstream use of NMR by chemists (of all sub-disciplines) and by many physicists, biologists, materials scientists and geologists etc. working with NMR.

The document presents recommended notation for use in journal publications involving a significant contribution of nuclear magnetic resonance (NMR) spectroscopy. The recommendations are in two parts:

A. Experimental parameters which should be listed so that the work in question can be repeated elsewhere.

B. A list of symbols (using Roman or Greek characters) to be used for quantities relevant to NMR.

This report was prepared for publication by Robin K. Harris[1], Jozef Kowalewski[2] and Sonia Cabral De Menezes[3] ([1]Department of Chemistry, University of Durham, South Road, Durham DH1 3LE, UK; [2]Division of Physical Chemistry, Arrhenius Laboratory, Stockholm University, S-10691 Stockholm, Sweden; [3]PETROBRAS/CENPES, Divisão de Quimica, Ilha do Fundão, Quadra 7, Cidade Universitaria, 21949 900 Rio de Janeiro, R.J., Brazil), of the Commission on Molecular Structure and Spectroscopy, Physical Chemistry Division. The full details are to be found in Pure Appl. Chem. *1997, **69**, 2489–2495.*

Compilation and critical evaluation of structure–reactivity parameters and equations: Part 2. Extension of the Hammett σ scale through data for the ionization of substituted benzoic acids in aqueous organic solvents at 25 °C (Technical Report)

Synopsis: Data have been compiled for the p*K* values in certain aqueous organic solvents at 25 °C of about 70 *meta*- or *para*-substituted benzoic acids, with a view to proposing values of Hammett constants, σ, in the case of substituents for which values cannot be based on the ionization of substituted benzoic acids in water (Part 1). The emphasis of the work is on the use of data for the apparent p*K* values of the acids in 1:1-EtOH-H_2O, i.e. a solvent made up of equal volumes of ethanol and water. A calibration equation is derived relating substituent effects measured in this solvent to those measured in water. On the basis of this equation σ values are proposed for 25 substituents, although some of the values are subject to *caveats*, and several further substituents are also discussed.

This report was prepared for publication by: John Shorter (School of Chemistry, University of Hull, Hull HU6 7RX, UK), for the Working Party on Structure–Reactivity Parameters and Equations of the Commission on Physical Organic Chemistry, Organic Chemistry Division. The full details are to be found in Pure Appl. Chem. *1997, **69**, 2497–2510.*

Source-based nomenclature for non-linear macromolecules and macromolecular assemblies (IUPAC Recommendations 1997)

Synopsis: A source-based nomenclature for non-linear macromolecules and macromolecular assemblies is proposed. Source-based or structure-based names for linear regular (single-strand and double-strand) and irregular macromolecules can be derived using rules published previously. In contrast, the present document deals with the source-based naming of non-linear macromolecules and assemblies of macromolecules. The former comprise branched, graft, comb, star, cyclic and network macromolecules; the latter comprise polymer blends, interpenetrating polymer networks and polymer-polymer complexes. The names of non-linear macromolecules are formed by citing source-based name(s) of the constituent linear chains(s) and denoting their mode(s) of combination by prefixes and connectives. Specification of molecular weight, composition or branch-point functionality(ies) of the macromolecule or its constituents may be given. in parentheses.

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This report was prepared for publication by: J. Kahovec (Czech Republic), P. Kratochvíl (Czech Republic), A. D. Jenkins (UK), I. Mita (Japan), I. M. Papisov (Russia), L. H. Sperling (USA) and R. F. T. Stepto (UK). For the Commission on Macromolecular Nomenclature, Macromolecular Division. The full details are to be found in Pure Appl. Chem. *1997, **69**, 2511–2521.*

Conference report

27th International Vacuum Microbalance Techniques Conference 16–18 July 1997, UMCS Lublin, Poland

Poland was the first country in Central Europe to host one of the series of *International Vacuum Microbalance Techniques Conferences*, the 27th, in 1997. The Thermal Analysis Group in the newly created Department of Physical Chemistry of Solid State (Department of Physical Chemistry, Chemistry Faculty, Maria Curie-Sklodowska University in Lublin) organised the Conference. Joint sponsors of this conference were the Polish Chemical Society, Science Society of Lublin and Polish Society of Calorimetry and Thermal Analysis. The conference was also sponsored by IUPAC, BKM Mainz (Germany) and 17 different companies from Lublin (Poland).

Seventy participants from 10 countries (Argentina, England, Germany, Netherlands, Hungary, Italy, Poland, Russia, Spain, Ukraine) and 5 exhibitors of scientific apparatus (C.I. Electronics Ltd, England; Mettler-Toledo, Warsaw; Perkin Elmer, Warsaw; Projekt & Montat - TA Instruments, Warsaw; TAK Poland, Warsaw) took part in the 27th IVMT Conference.

Unfortunately, just before the start of the conference more than a dozen potential participants cancelled their participation because of disastrous floods in Poland, the Czech Republic and Germany. Because of this, the conference program was slightly changed. A number of pioneers and specialists in microbalance vacuum techniques and thermal analysis (Th. Gast, Germany; F. Paulik, Hungary; J.A. Poulis, Netherlands; E. Robens, Germany, J.C. Bazan, Argentina; V.A. Tertykh, Ukraine; V.I. Bogillo, Ukraine and L. Stoch, S.L. Randzio, W. Rudzifiski, W. Brzyska, S. Halas, R. Leboda, G.W. Chadzynski from Poland) took part in the conference.

The opening ceremony was attended by: M.C.-Sklodowska University Rector—Kazimierz Goebel, M.C.-Sklodowska University v-Rector—Zbigniew Krupa, Chemistry Faculty v-Dean—Jan Rayss, Chairman of the International Steering Committee—Erich Robans, IUPAC Representative—Adam Hulanicki and Conference Chairman—Piotr Staszczuk.

The chairpersons of the plenary sessions and meeting of the International Steering Committee were:

I A. Hulanicki (Poland) and L. Stoch (Poland),
II W. Brzyska (Poland) and G.W. Chadzyniski (Poland),
III F. Paulik (Hungary) and Th. Gast (Germany),
IV J. A. Poulis (Netherlands) and J.C. Bazan (Argentina),
V C. Pesquera (Spain) and S.L. Randzio (Poland),
VI S.V. Tertykh (Ukraine) and S. Halas (Poland) and
VII E. Robens (Germany).

The opening lecture was presented by: Th. Gast (Germany),

The six plenary lectures were presented by F. Paulik (Hungary), E. Robens (Germany), L. Stoch (Poland),

Opening ceremony. From the right: Adam Hulanicki—IUPAC representative. Erich Robens—Chairman of the International Steering Committee; Kazimierz Goebel—M. C.-Sklodowska University Rector-Welcome and introduction; Zbigniew Krupa—M. C.-Sklodowska University v-Rector; Jan Rayss—Chemistry Faculty v-Dean; Piotr Staszczuk—Conference Chairman.

Prof. Ferenc Paulik's plenary lecture. Chair persons: Prof. L. Stoch and Prof. A. Hulanicki (on the left).

S.L. Randzio (Poland), Z. Ali (England), G.W Chadzynski (Poland). There were an additional 18 lectures and 31 posters.

The topics of the conference included measurement of the change of sample mass loss in vacuum and in a controlled atmosphere, balance history and modern technical studies and applications, thermal analysis and its special techniques and applications, sorption measurements, chemical reactions and phase transitions. The participants presented new and pioneer methods, results and practical applications of the microbalance techniques and special thermal analysis methods. The results of the studies of important materials (adsorbents, zeolites, superconductors, minerals and new chemical compounds) by means of new apparatus and their theoretical interpretation were presented. During the plenary and poster sessions there were many discussions, exchanges of opinions and papers and many new contacts and plans for co-operation were made.

Conference welcome social at Stary Tartak near Koziowka. M. C.-Sklodowska University Popular Dance Group sings a Hungarian song for Prof. F. Paulik and his wife.

The conference was summarized by the Chairman of the International Steering Committee—Erich Robens. The 28th IVMT Conference will take place in Kiev (Ukraine) in 1999 and 29th RMT Conference in Middlesbrough (UK) in 2001. Erich Robens was confirmed as Chairman of the International Steering Committee and Grzegorz Chadzyfiski (Wroclaw, Poland), Piotr Staszczuk (Lublin, Poland) and Amara Jayaweera (Middlesbrough, UK) were elected as vice-Chairmen. Information about the 27th IMT Conference was published on the Internet and on local Lublin radio and TV. The proceedings will appear as a special issue of the *Journal of Thermal Analysis* (1998).

I would like to mention with gratitude the work of the Science and Organizing Committee members. Meetings took place in an excellent, friendly atmosphere. Three excursions allowed the participants to see the historic town and some of the lovely countryside. The Organizing Committee received many letters from participants congratulating it on a successful international event.

Piotr Staszczuk
Conference Chairman

News

Professor Mthembeni 'Mac' Zulu

It is with sad regret that we have to inform you of the passing of Professor Mthembeni 'Mac' Zulu. He died in a head-on collision on the 18th October 1997. He was a member of Commission II.2. The funeral was on 25th October.

1998 Wolf Prize in Chemistry

Jerusalem—Professors Gerhard Ertl of the Fritz-Haber Institute, Max-Planck Gesellschaft, Berlin, and Gabor A. Somorjai, of the University of California and the Lawrence Berkeley Laboratory, Berkeley, were named the 1998 Wolf Prize winners in Chemistry for their outstanding contributions to the field of surface science.

The Israel-based Wolf Foundation announced that both distinguished scientists will share the $100 000 award for their elucidation of fundamental mechanisms of heterogeneous catalytic reactions at single crystal surfaces.

Gerhard Ertl, born 1936, and Gabor A. Somorjai, 1935, have laid the foundation of our present conceptual understanding of catalyzed chemical reactions at surfaces, of enormous importance in industrial technology as well as basic science. Modem surface technologies are applied in many industrial processes such as chemical catalysis, electronics, lubrication, and materials science. Efficient surface catalysts help as well to sustain a clean environment by promoting reactions which destroy toxic pollutants.

Gabor A. Somorjai, has been Professor at the Univer-

sity of California, Berkeley, and Senior Scientist of the Materials Science Division, at the Lawrence Berkeley Laboratory, since 1994. Born in Budapest, he received his BSc from the Technical University, Budapest, and PhD from the University of California in 1972. He is a member of the National Academy of Sciences, USA, of the American Academy of Arts & Sciences, and a Fellow of the Academy of the Physical Society.

Professor Gerhard Ertl, born in Stuttgart, has been associated with the Fritz-Haber Institute of the Max-Planck Gesellschaft, Berlin, since 1988. He received his Ph.D. from the Technical University München, after attending the Technical University of Stuttgart and the University of Paris. He is Honorary Professor of the Free and the Technical Universities of Berlin, was Director of the Institute of Physical Chemistry, University of München, and visiting Professor at the California Institute of Technology, and University of California, Berkeley.

The Wolf Prizes were presented on 10 May 1998 by the President of Israel, Ezer Weizman, at the Knesset (Parliament) building in Jerusalem. Annual awards of $100 000 in each category are made for outstanding achievements in Agriculture, Mathematics, Medicine, Physics, the Arts, as well as Chemistry.

The previous Wolf Prize in Chemistry was awarded to Gilbert Stork, Professor Emeritus of Columbia University, New York, and Professor Samuel J. Danishevsky, Director of the Laboratory for Bio-organic chemistry of the Memorial Sloan-Kettering Cancer Center, New York. Since 1978, 175 laureates from 18 countries have been honored by the Wolf Foundation.

The Wolf Foundation was established by the late Dr. Ricardo Wolf, inventor, diplomat, and philanthropist, 'to promote science and art for the benefit of mankind'. Born 1887 in Germany, Dr Wolf emigrated to Cuba, and in 1961 was appointed Cuban Ambassador to Israel where he lived until his death 20 years later.

News from associated organizations of IUPAC

International Council for Scientific and Technical Information (ICSTI). Highlights of the winter committee meetings 10–11 January 1998, ICSTI Headquarters, Paris

Once again the Winter meetings were well attended with a total of 28 participants. The discussions, which covered a wide spectrum of topics, were enlightening and provided a truly international forum with representatives from seven countries: France, Japan, the Netherlands, Russia, South Africa, UK and USA.

The participants discussed the current and future technical programme and acknowledged the increasing importance of policy over technical issues. This trend must be reflected in the activity programme to respond better to the expectations of ICSTI members. They heard a report from David Lide on recent developments in the USA on database protection, and a presentation by Christine Deschamps President of EFLA. They discussed ways of- enlarging the membership. They agreed on the discussion topics for the next General Assembly and on the slate for election of the new Executive Board.

Technical programme

Current projects

- The pilot project on access to telematics facilities in the Eastern Caribbean, which was jointly sponsored by six international organizations including UNESCO, the Pan American Health Organization (PAHO) and ICSTI, has entered its final phase. ICSTI will deliver the final project evaluation report to UNESCO by 31 January 1998, and Elliot Siegel, project coordinator, will give a final report to ICSTI at the 1998 General Assembly.
- The project to establish a unified alphabetical finding list of terms used in physics with references to all current classification schemes, and to mount the schemes and the list on the ICSTI Website is being pursued by John T. Scott. VINITI will provide technical support.
- The cooperative project with the ISSN International Centre, which aims to add information on A&I services to the ISSN Register, has been pursued with tests on ISSN matching between members' databases and the ISSN Register, and the results are very encouraging. All members concerned are invited to send their tapes to Slawek Rozenfeld, Head of the Computer Section (rozenfeld@issn.org). Suzanne Santiago indicated that she will leave the ISSN International Centre to take up the position of Director of ABES, the National Agency for the French Academic Bibliographic Network. She confirmed, nevertheless, the commitment of the ISSN Centre to cooperate with ICSTI.
- Concerning the Multilingual Thesaurus of Geosciences, it was indicated that it will not be mounted on the Web at this stage because IUGS/COGEOINFO expects to finance longer term maintenance of the MT from licences for its use in specific applications. A small sample will be mounted on the Web for promotion purposes and this could be linked to the ICSTI Website.
- The comparative study of access to journals through subscriptions and document delivery has been finalized and the report is available on the ICSTI

Website.

- The results of the survey of ICSTI members on their use of electronic networks presented at the last General Assembly are available on the private page of the ICSTI Website.

New projects

- In response to a need expressed by several members at the last General Assembly, a survey aimed at obtaining information on end-user needs and expectations of network-based products and services has been proposed. Wubbo Tempel and Henk Compier have set up the methodology and prepared a questionnaire which will be distributed to members for follow-up action.
- A proposal to develop a joint classification scheme for the Life Sciences has been further examined by Joan Thorne at BIOSIS UK. Because of the diversity of the existing schemes. it is unlikely that a common scheme can be created, but an alternative might be a look up file in which users could enter a concept of interest and be directed to where that concept might be found in member services. An exploratory meeting among interested members has been scheduled for February 1998 in Paris. If the proposal meets with their agreement and commitment, it will be put forward for consideration as a formal ICSTI project at the next General Assembly.

Information policy issues

John Anderson chaired the first meeting of the Information Policy Committee. All discussions and comments highlighted the growing importance of information policy issues and the need to set up a working procedure so as to monitor them and take action.

A working document which has been mounted on the private page of the ICSTI Website includes a glossary of terms, and a matrix of members' attributes aimed to provide quick reference to appropriate organizations on a given question. Members are invited to check their entry and ask for changes if necessary.

Two proposals were examined:

- one for a cooperation between ICSTI and CENDI, the US Federal STI managers interagency working group, to cover better STI management issues and linking to related sites. They suggest information sharing through a cooperative agreement whereby they would focus on US sites while ICSTI would focus on Europe and other areas. This proposal will be followed up by both Secretariats.
- the other for a discussion session during the next General Assembly, proposed by Sumio Horiuchi of JST, on the problems raised by restructuring in the information industry. This proposal was accepted.

Discussion session

Recent developments in copyright legislation

Attention was drawn to the report provided by Dan Wilde on behalf of the Committee on Legal Issues. This report has been mounted on the private page of the ICSTI Website.

David Lide gave a presentation on recent developments in the USA. He recalled that following deferral of the draft treaty on intellectual property in databases at the WIPO diplomatic conference held in December 1996, WIPO convened an information meeting in September 1997 to discuss possible further action. The consensus of the meeting was that the issue of *sui generis* database protection was not ready for WIPO actions and that further deliberations were needed.

New draft legislation was introduced in the House of Representatives in October 1997. The proposed bill* entitled 'Collections of Information Antipiracy Act' (H.R. 2652) is raising less opposition within the library and scientific communities, as it drops the *sui generis* database protection in favour of other concepts. It should be noted that the Registrar of Copyrights has expressed a need for database protection in the 'Report on legal protection for databases' to be found on the Library of Congress Website at:

http://lcweb.loc.gov/copyright/more.html#rpt

The American Association for the Advancement of Science (AAAS) has issued a statement on intellectual property protection for databases which explains the AAAS position against sui generis intellectual property rights proposals. The text can be found at:

http://www.aaas.org/spp/dspp/sfrl/aaasdb.htm

On the European scene, David Russon indicated that the European Union has issued a draft directive on Copyright and Related Rights in the Information Society. The full text can be found at:

http://www.europa.eu.int/comm/dg15/en/intprop/intprop/1100.html†

Presentation on IFLA

Christine Deschamps, who is the new President of IFLA (International Federation of Library Associations and Institutions), presented the structure and activities of IFLA which aims at international cooperation in all fields of library activities. Details can be found at:

http://www.nlc-bnc.ca/ifla/

There are several areas where cooperation could be established between IFLA and ICSTI. In the area of electronic archives, IFLA has a project with FID and ICA, and is involved in a draft standard being developed by ISOITC 46. IFLA is also involved in issues of pay-

*Copy available from the ICSTI Secretariat.

†The repetition of 'intprop' is not an error!

ment for electronic information through two of its committees: one on legal matters and the other on freedom of access to information and freedom of expression.

It was agreed that the two organizations would establish communication and exchange of information to find a common agenda of actions.

Annual meetings

1998 General Assembly

As announced on several occasions the 1998 General Assembly will be held on 21–25 May at Loch Lomond, near Glasgow. It is hosted by the British Library supported by BIOSIS UK. It will include three discussion sessions on the following topics:

- Development of electronic libraries, organized by David Russon;
- Restructuring in information industry, organized by Surnio Horiuchi;
- Recent developments in description of information items, organized by Eamon Fennessy.

The meeting package will be dispatched at the beginning of February.

1999 General Assembly

An invitation to host the 1999 General Assembly in Taipei, Taiwan, has been extended by the Science and Technology Information Center (STIC). The Executive Board made a recommendation to accept the invitation.

Federation of the European Chemical Societies

6th-FECS-Conference-on-Chemistry-and-the-Environment: Atmospheric Chemistry and Air pollution (VOC, oxidants/Nox and Particulates) 26–28 August 1998, Copenhagen Denmark.

Scope of the conference

The purpose of the conference is to bring together scientists and others from different areas within atmospheric chemistry and air pollution research and control in order to discuss current knowledge and future developments.

The main topics will include:

- Volatile organic compounds (VOCs)
- Oxidants, including ozone and NOx
- Particulate matter

On each of these main topics there will be sessions on the following subtopics:

- Anthropogenic and biogenic sources of emissions and exposures, pollution prevention, standards and regulations
- Measurements/monitoring of air quality and air emissions
- Atmospheric chemistry and fate of chemicals
- Effects of air pollutants on vegetation and human health

Modeling is considered an integral part of each topic.

Plenary lectures

Laboratory studies of hydrocarbon reactions of importance in regional air quality. *A. R. Ravishankara, NOAA, USA*

The future role of chemistry in air pollution modeling. *William R. Stockwell, Fraunhofer Institute, Garmisch-Partenkirchen, Germany*

Physical and chemical characterization of particulate matter emissions from air pollution sources. *Glenn Gass, Caltech, USA*

Studies of processes affecting airborne particulate matter: Source and ambient air. *Roy Harrison, University of Birmingham, U.K.*

Secondary environmental chemicals: sources, fate and impact of haloacetic acids. *Hartmut Frank, Univ. Bayreuth, Germany*

Atmospheric chemistry of selected automotive fuels and fuel additives. *T. J. Wallington, Ford Motor Co, Detroit, USA*

NMHC climatology in Northern Europe. *Anne Lindskog, WL, Gothenburg, Sweden*

Gas-particle partitioning and particle formation from secondary aerosols. *Richard Kamens, Univ. NC, Chapel Hill, USA*

Sampling and analysis of biogenic hydrocarbons in air—an overview. *Bo Larsen, JRC, Ispra, Italy*

Deposition of ozone to plant canopies—Mechanisms and effects. *Helge Ro-Poulsen, Copenhagen University, Denmark*

Laboratory studies of aldehyde and ketone reactivity. *Claus J. Nielsen, Oslo University, Norway*

Risk of cancer and exposure to gasoline vapors. *Elsebeth Lynge, Danish Cancer Society, Copenhagen, Denmark*

Monitoring airborne particulates—new CEN standards. *T. van der Meulen, RIVM, Billhoven, the Netherlands*

70th Birthday of Wolfgang Fritsche

Dr Wolfgang Fritsche CChem HonFRSC, Honorary Life President of FECS, celebrated his 70th birthday on 11 March 1998. A press release issued by the Gesellschaft Deutscher Chemiker can be accessed on the internet at http://www.gdch.de/pubrelat/wpd0698.htm

112th AOAC International Annual Meeting and Exposition, 13–17 September 1998, Montréal, Quebec, Canada

Scheduled program topics

- Analytical Assessments to Assure Consistency and Biological Equivalence of Biotechnology Derived Products
- Application of LCIMS and CEIMS fbr Food Analysis
- Capillary Electrophoresis/HPLC
- ELISA Methodology and Food Testing
- Implementation of ICH Validation of Analytical Procedures for Pharmaceuticals
- Laboratory Management Issues
- Measurement of Moisture in Oils
- New Trends in Sample Preparation Techniques
- Quality Assurance in the Analytical Laboratory
- Regulatory Issues Related to Maple Sap, Maple Syrup, and Maple Sap/Syrup Products
- Parasitology in Water and Foodborne Pathogens (Cyclospora, Cryptosporidium, and Toxoplasmosis)

Numerous poster sessions will give participants the chance to talk with presenters one-on-one.

The always popular Regulatory Roundtable (with a focus on rapid methods of food analysis to supplement complex instrumental analysis in 1998) brings representatives from regulatory agencies worldwide to talk about upcoming programs and to meet in small groups to answer questions, learn about the concerns of the technical community and discuss issues in depth.

Laboratory exposition

The Expo will showcase the latest in laboratory equipment and services.

Training courses

These continuing education opportunities are scheduled before and after the meeting. Courses may include:

- Quality Assurance for Analytical Laboratories
- Quality Assurance for Microbiological Laboratories
- Implementing Good laboratory Practices
- Basic Statistics fbr Analytical Science
- Statistics for Method Development
- Intralaboratory Analytical Method Validation
- ISO9000, ISO/IEC Guide 25, and the laboratory

For more information contact the AOAC International Meetings and Education Department by Phone: toll-free +1 800 379 2622 from North America only, +1 301 924 7077 world-wide; Fax: +1 301 924 7089; or Internet email: meetings@aoac.org or the AOAC web site: http://www.aoac.org for regularly updated information on the meeting.

New books

Japanese Language Translation of Quality Assurance Principles for Analytical Laboratories

AOAC International has announced the publication of a new book, the Japanese language translation of *Quality Assurance Principles for Analytical Laboratories* written by Frederick M. Garfield. The translation was prepared by a member of AOAC, Makoto Miyahara of the National Institute of Health Sciences, Japan.

This handbook provides guidelines and specific recommendations for initiating or improving a laboratory quality assurance (QA) program. It also provides justification for commitment of resources toward improved laboratory operations.

The book draws on published principles, practices, guidelines, and procedures used by many organizations—and includes illustrations of forms, reliable practices, procedures, and information used by several US federal agencies.

This edition contains a chapter on statistical applications and analytical control charting which calls attention to how these techniques can be used in a QA program, and an appendix that provides criteria which can be used by laboratories for self-evaluation of their QA programs.

The cost of the 188 page softcover book is $155 in North America (USA, Canada, Mexico) and $172 outside North America, with a 10% discount for members of AOAC International.

For more information, or to order the Japanese Language translation of *Quality Assurance Principles for Analytical Laboratories*, contact AOAC International by Tel.: +1 301 924 7077, fax: +1 301 924 7089, Internet: pubsales@aoac.org, or mail: 481 North Frederick Avenue, Suite 500, Gaithersburg, MD 20877-2417, USA.

Dietary fiber analysis and applications

AOAC International has announced the publication of a new book, *Dietary Fiber Analysis and Applications*, by Sungsoo Cho (Kellogg Company), Jonathan W. DeVries (General Mills, Inc.), and Leon Prosky (Retired, US Food and Drug Administration).

This manual provides up-to-date information on the chemical properties of dietary fiber and reliable analytical methodology with an emphasis on AOAC® *Official Methods*℠. Vital information is presented in a straightforward manner and complex concepts are made simple. Numerous charts, tables, and figures are also employed to provide further illustration of more difficult topics.

The information contained in this manual will help analytical chemists select and use the most appropriate methods and techniques in analyzing food samples. It will also help nutritionists, food scientists, and health

professionals interpret dietary fiber data derived from such analysis.

The cost of the 202 page softcover book is $83 in North America (USA, Canada, Mexico) and $100 outside North America, with a 10% discount for members of AOAC International.

For more information, or to order Dietary Fiber Analysis and Applications, contact AOAC International by phone: +1 301 924 7077, fax: +1 301 924 7089, Internet: aoac@aoac.org, or mail: 481 North Frederick Avenue, Suite 500, Gaithersburg, MD 20877-2417 USA.

HUGO SCHIFF INTERNATIONAL 'Store House': Florence, Italy.

The 'Hugo Schiff International Storehouse' is a project of the Laboratory of Educational Research of the Department of Chemistry at the University of Florence. The plan will become finalized with the restructuring of the 'GreatHall' of the Chemistry Department at the University of Florence. In essence, this will serve as an international centre for the 'History of Chemistry'.

The H. Schiff Store House, according to our projections, will become a multimedia opportunity, designed for the educational use of telematic communications in the World Wide Web, particularly aimed at communicating the History of Chemical Science and Technology. Thus, the Hugo Schiff Great Hall, rather than being abandoned following the transfer of the Chemical Institute to the Sixth Campus in the suburbs of Florence, will become a cultural and scientific centre. A place of international reference for the study and research of multiple historical-cultural relations that link the city of Florence to the history of Chemistry, even prior to the traditions of alchemy—and on a world level. The Store House, named after Hugo Schiff (1834-1915), the famous chemist who founded the Chemical Institutes of Florence, will thus become a place of historical-scientific research, with a strong educative aspect, including a 'Virtual Museum and International Multimedia Archive'. The use of telematic distance education will help realize innovative didactics and bibliographies, adapted to the cognitive and historical scientific aspects of chemistry.

LRE initiated the promotion of the Hugo Schiff Store House project, in order to begin documenting the works of H. Schiff. Research was begun in 1984, the year in which we initiated a historiographic investigation of the scientific activities of the Schiff brothers Hugo (chemist) and Maurice (naturalist), who both lived in Florence for years, in addition a Convention for the 150th anniversary of H. Schiff's birthday (25 October 1884) was organized, in collaboration with the University of Florence, the Italian Chemical Society, the town council and province of Florence, and the Tuscany Region. Following the conference, we proposed the idea of founding a Hugo Schiff Storehouse.

Discussions are being held with the Chemical Heritage Foundation (see: http://www.chemheritage.org/), with the goal of developing a close collaboration between Europe and the USA on the Hugo Schiff Store House International project. CHF has shown interest in this idea. They have invited Dr Paolo Manzelli, the coordinator of the Laboratory of Educational Research at the University of Florence, to Philadelphia, PA, USA. The purpose of the visit will be to detail the criteria of an eventual collaboration on the project, that is forseen to unfold at the convention of the History of Chemistry, to be held in the year 2000, the year of the Jubilee, for which we have already gained the approval of the Commission for Cultural Events of the Town Council of Florence.

For further information contact: Prof. Dr Paolo Manzelli, Direttore del Laboratorio di Ricerca Educativa, Facolta' di Scienze Mat. Fis. e Nat., Universita' degli Studi di Firenze, Tel.:. + 39-55-332549, Fax: + 39-55-354845, E-mail: lre@chim1.unifi.it, http://www.chim1.unifi.it/group/education

New books from IUPAC

Principles of Chemical Nomenclature

This book arose out of the convictions that IUPAC nomenclature needs to be made as accessible as possible to teachers and students alike, and that there is an absence of relatively complete accounts of the IUPAC 'colour' books suited to school and undergraduate audiences. This is not to decry in any way the efflorts of organisations such as the Association for Science Education (ASE) in the UK, but what we wished to produce was a version of IUPAC rules that would be relatively complete and allow the beginner to explore and learn about nomenclature as much or as little as desired.

It is hoped that this volume will more than cover all the nomenclature requirements of students at pre-University and early undergraduate levels in most countries. It should also enable University students and teachers to learn the basic principles of nomenclature methods so that they can apply them accurately and with confidence. It will probably be too advanced for school students, but should be useful for their teachers.

Principles of Chemical Nomenclature. Editors: G.J. Leigh, H.A. Favre & W.V. Metanomski. Published by Blackwell Science Ltd. 30 illustrations, 144 pp. ISBN 0865426856 (paperback). Price £18.50. January 1998

Compendium on Analytical Nomenclature

The first edition of the *Compendium on Analytical Nomenclature* was published in 1977, as a result of the pioneering work of the editors, H.M.N.H. Irving, H. Freiser and T.S. West. It was a collection of all those reports on analytical nomenclature which had been accepted by the competent IUPAC bodies and published in Pure and Applied Chemistry between 1960 and 1976 (one in 1978), a total of 23 reports.

In the Preamble to the first edition the editors devoted a whole section to ideas and recommendations concerning the standardization of nomenclature. The contents of this section are still useful for all those who are committed to the standardization of symbols and terms to be used in analytical chemistry.

The second edition of the Compendium was published in 1987, in which the chapters were revised, supplemented or replaced by the reports on nomenclature (11) which had appeared between 1976 and 1984.

The manuscript was prepared by H. Freiser and G.H. Nancollas. The original format and structure of the first edition was kept, including the useful alphabetical index of terms.

In 1992, A. Hulanicki, President of the Division of Analytical Chemistry of IUPAC initiated a comprehensive revision of the Compendium, because of the great number of reports on nomenclature that appeared in the early 90s, due to the acceleration of the work within the commissions.

In the last decade the demand for new analytical procedures has increased steadily and at the same time the diversity of the techniques has expanded and the quality and performance characteristics of the procedures have come to be a focus of interest. New types of instrumental and automatic techniques have emerged and computerization has taken over. The scope of analytical chemistry has been widened as the question to be answered was not only the chemical composition of the sample, but also the structure,of substances, and changes in composition and structure in space and time.

In step with the revolutionary development of analytical chemistry the use of these analytical procedures—as tools yielding chemical information on material—has become indispensable in nearly all fields of human activities, including research, development, production and service.

The widespread application of analytical methods has called for scientific and universal regulation of the terms used, for the sake of uniformity, for understandability and for straightforward communication between experts in the most diverse fields.

For the above reasons the Analytical Division Committee of IUPAC has instituted and supported this revision of the Compendium. A Working Party for the revision was established from those who had the responsibility of preparing the drafts and the final text for publication. In addition, each Commission delegated a 'coordinator' whose responsibility was to mediate between the Working party and their Commission.

Nonlinear Spectroscopy for Molecular Structure Determination

Since its advent in 1960, the laser has played many very important roles in molecular spectroscopy. At present it would be almost impossible to find a laboratory that investigates molecular structure and dynamics which is not equipped with any lasers. Even in the early period of the development of laser applications, scientists realized that the most remarkable characteristics of laser light are coherence, high power density and high spectral purity. These are the ideal characteristics for the observation of nonlinear phenomena. Nonlinear spectroscopy, made feasible by lasers, has proved to be an extremely powerful tool for molecular structure studies. It allows us to examine new aspects of molecular processes in detail and to determine molecular parameters orders of magnitude more precisely and rapidly than with conventional light sources.

A large variety of nonlinear spectroscopic methods have so far been developed and applied to studies of molecular structure and dynamics. Some of these methods utilize complex techniques, making it difficult to understand the underlying principles. Furthermore, most of these methods are referred to by nicknames or acronyms, which keeps them shrouded in mystery for most non-specialists who are thereby discouraged from mastering and applying the methods to molecular systems.

Under these circumstances it was judged appropriate and timely to overview those nonlinear spectroscopic methods which are currently particularly useful for studies of molecular structure and dynamics. Thus, the Commission on Molecular Structure and Spectroscopy of the International Union of Pure and Applied Chemistry decided to publish a book, intended to provide an introduction to nonlinear spectroscopy for non-specialists .

The first chapter of the book is devoted to introduction of the basic principle of coherent interaction of the laser light field with molecules including higher-order nonlinear effects. This chapter is intended to minimize difficulties which readers might face in understanding the following chapters. Chapters 2 through 10 present nine kinds of laser spectroscopic methods which elucidate the structure and dynamics of excited molecules, chemically reactive species, molecules in liquids or on surfaces, and so on. Each chapter describes first the underlying principle of the method and its typical experimental setup in order to allow a clear understanding by readers who are not familiar with laser spectroscopy. In

the remaining part of each chapter, several typical examples of the application are given together with the current status of the method.

Nonlinear Spectroscopy for Molecular Structure Determination. Authors: R.W. Field, E. Hirota, J.P. Maier, S. Tsuchiya (Coordinator). Published by Blackwell Science Ltd. 120 line illustrations. 288 pp. ISSN 0632042176. Price £55.00. February 1998.

Organic Light-Emitting Materials and Devices, Macromolecular Symposia V125, 1997

The international symposium on '*Organic Materials and Devices in Display Technologies*' was held as part of the 213th ACS National Meeting in San Francisco on 13–15 April 1997. Organic light-emitting diodes (LED) and liquid crystal displays (LCD) were the focus of the symposium. 'Display technology is the final frontier in the information superhighway' was used as the symposium logo. There were 6 oral sessions (46 papers) followed by a poster session (24 papers). 37 papers were from North America (36 from USA, 1 from Canada), 20 from Europe and 13 from Asia. The oral sessions included: (1) tutorial on organic electroluminescence technology; (2) synthesis of organic light emitting materials; (3) new light emitting device concepts; (4) polymeric LED systems; (5) organic materials for LCD applications; (6) stability of organic LEDs. The symposium was very popular, with excellent attendance of 120 to 250 people, indicating a very strong interest in the area.

There were two unique features that distinguished this symposium from most other ACS symposia. First, the participants of the symposium included a mix of chemists, physicists, and engineers, reflecting the highly interdisciplinary nature of organic display technology. Second, about half of the participants were from industry. This is highly unusual for ACS meetings and is in accord with the fact that the number of labs that are involved in this field has increased over the past years.

This volume contains selected symposium papers on the subject of organic electroluminescent (EL) materials and devices. Although this is a relatively new area, there has been tremendous progress made. This is clearly reflected in the papers in this volume. It is now commonly agreed that commercialization of organic LEDs is imminent.

B. R. Hsieh,
Webster, New York, June,1997

Surface Modification of Polymers, Macromolecular Symposia V126, 1998

The Institute of Polymer Research Dresden and the Institute of Macromolecular and Textile Chemistry of the Dresden University of Technology have organized Dresden Polymer Discussions on different topics of polymer science since 1986.

The sixth in this series of discussion meetings held within a limited circle of invited researchers, was held in Meissen near Dresden from April 14 to 17, 1997. It was dedicated to the field '*Surface Modification*' and included topics such as:

- Adsorption of functional polymers
- Polyelectrolytes, polyelectrolyte complexes, surfactants
- Ordered thin layers
- Surface characterization
- Polymers in solutions and at interfaces
- Grafting

The meeting assembled more than 40 scientists from 12 countries with researchers from the Dresden institutes. They discussed 30 oral and 25 poster presentations.

Particular attention was paid to the relevance of surface phenomena and surface modification for practical applications. The participation of a number of representatives from industry stimulated discussions in this respect.

Interface phenomena and optimized design of interfaces have been gaining increasing importance in technological processes; however their scientific fundamentals have not yet been established. The gap between advanced theoretical works on the understanding of real systems and processes needs to be pursued in joint efforts.

Hans-Jorg Jacobasch,
Symposium Editor, Dresden, July 1997

Petro Polymers vs. Green Polymers, Macromolecular Symposia V127, 1998

The Rolduc Polymer Meeting was organized in 1997 for the 10th time. Over the years this discussion meeting, known for its intensive debates on up to date themes, has acquired both an intimate and an international character. The success of the Rolduc Polymer Meetings is also based on extensive and active participation by industrial researchers and research managers. Due to their contributions, we were able to achieve the integration of Polymer Science and Polymer Technology that was aimed at.

Discussion in society about sustainability, about reproducible natural resources, on fossil resources may well influence the long-term future of polymer materials. The International Organizing Committee of the Rolduc Polymer Meeting therefore decided to organize a thorough discussion on the topic *'Petro(chemical) based Polymers' versus 'Green Polymers'*.

For thousands of years nature was the only source of polymeric materials and even at this moment quite a list of natural polymer products is still present on the market (c. g. wool, silk, cotton, cellulose, natural rubber, varnish

etc.). We all know the extensive list of synthetic polymers, for the greater part based on fossil hydrocarbons. The latest developments and the 'green character' of both these types of polymer were discussed in two separate sessions.

Some polymers are produced both by industry and by nature (polyaminoacids, polyesters, casein) and the production of synthetic polymers from 'green monomers' (CO_2, CH_4, ethylene etc.) was shown to be well within reach. Finally, combinations of products from both areas may lead to attractive new materials (composites and blends of synthetic and biopolymers, chemically modified green polymers, copolymers and so on). The synergy of 'Petrobased' and 'Green' polymers combinations was intensively discussed.

This volume covers most oral contributions presented at the meeting and some selected poster presentations.

Ludo Kleintjens, Chairman

Received at the Secretariat

Nomenclatura de Química Inorganica, Recomancions de 1990
A Catalan translation of the Nomenclature of Inorganic Chemistry by Enric Casassas i Simó and Joaquim Sales i Cabré. Available from the Institut d'Estudis Catalans, Carrer del Carme 47, ES-08001 Barcelona, Spain.

Conference Calendar

1998

Trace element speciation in biomedical, nutritional and environmental sciences

4–7 May 1998
1st International Conference on Trace Element Speciation in Biomedical, Nutritional and Environmental Sciences, Neuherberg, Munich, Germany.
Prof. Dr Peter Schramel, GSF-Forschungszentrum fur, Urnwelt und Gesundhuit GmbH, Institut fur Okologische Chemie, Neuherberg, D-85758 Oberschleissheim, Germany. Tel.: +08931874062.

Secretariat: Ulla Schrödel, GSF-Forschungszentrum, Postfach 1129, D-85758 Oberschelißheim, Germany. Tel.: +49 89 3187 3030, fax: +49 89 3187 3362.

Automation and new technology for the clinical laboratory

24–27 May 1998
International Congress on Automation and New Technology for the Clinical Laboratory, Santiago de Compostela, Spain.
Dr Ramon Galimany, Sociedad Espanola de Bioquimica Clinica y Patalogica Molecular, Padilla 323-325 Desp 68, ES 08025 Barcelona, Spain. Tel.: +34 3 446 26 70, fax: +34 3 446 26 72.

Degradation processes in the environment

24–28 May 1998
Measuring, Modelling, and Predicting Degradation Processes in the Environment, Dubronik (Cavtat), Croatia.
Dr Aleksandar Sabijic, Institute Rudjer Boskovic, PO Box 1016, HR-10001 Zagreb, Croatia. Tel.: +385 1 456 1089, fax: +385 1 272 648, e-mail: sabljic@olimp.irb.hr

Organic synthesis

28 June–2 July 1998
12th International Conference on Organic Synthesis (12-ICOS), Venice, Italy.
Prof. Carlo Scolastico, Dip.to di Chimica Organica e Industiale, Università di Milano, Via G. Venezian 21, I-20133 Milano, Italy. Tel.: +39 2 236 7613, fax: +39 2 236 4369, e-mail: nicotra@imiucca.csi.unimi.it

Heteroatom chemistry

5–11 July 1998
Fifth International Conference on Heteroatom Chemistry, London, Ontario, Canada.
Prof. Kim M. Baines, Department of Chemistry, University of Western Ontario, London, Ontario, Canada, London, Ontario N6A 5B7, Canada. Tel.: (519) 661-2166, fax: (519) 661-3022, e-mail: kbaines2@julian.uwo.ca

Chemistry in Africa

6–10 July 1998
7th International Conference on Chemistry in Africa, South Africa.
Prof. T. M. Letcher, Department of Chemistry & Applied Chemistry, University of Natal, Durban 4041, South Africa. Tel.: +27 (31) 260 1395, fax: +27 (31) 260 3091, e-mail: 7icca@scifs1.und.ac.za

Macromolecules

13–17 July 1998
37th International Conference on Macromolecules (MACRO '98), Gold Coast, Australia.
Prof. R. Gilbert, Chemistry School, Sydney University, NSW 2006, Australia. Tel.: +612 9351 3366, fax: +612 9351 3329

Photochemistry

19–24 July 1998
XVII IUPAC Symposium on Photochemistry, Sitges, Spain.
Prof. Josep Font i Cierco, Departament de Quimica, Universitàt Autonoma de Barcelona, Bellaterra, 08193 Barcelona, Spain. Tel.: +34 3 581 1255, fax: +34 3 581 1265, e-mail: iqorfont@cc.uab.es

Polymeric materials

20–23 July 1998
Mechanical Behaviour of Polymeric Materials, 18th Discussion Conference.
Dr Jaroslav Kahovec, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nám. 2, 162 06 Prague 6 - Petriny, Czech Republic. Tel.: +4202360341, fax: +4202367981, e-mail: sympo@imc.cas.cz

Chemical thermodynamics

26 July–1 August 1998
15th International Conference on Chemical Thermodynamics, Porto, Portugal.
Prof. Manuel A.V. Riberio da Silva, Department of Chemistry, Faculty of Science, Rua do Campo Allegre, 687, P-4150 Porto. Tel.: +35 12 6082821, fax: +35 12 2008628, e-mail: risilva@fc.up.pt

Novel aromatic compounds

2–7 August 1998
9th International Symposium on Novel Aromatic Compounds (ISNA-9), Hong Kong.
Prof. Henry N.C. Wong, Department of Chemistry, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong. Tel.: +852 2609 6344, fax: +852 2603 5057, e-mail: hncwong@cuhk.edu.hk

Pesticide chemistry

2–7 August 1998
9th International Congress on Pesticide Chemistry, London
Dr John F. Gibson, Scientific Secretary, The Royal Society of Chemistry, Burlington House, London W1V 0BN.

Solubility phenomena

5–8 August 1998
Eighth International Symposium on Solubility Phenomena, Niigata, Japan.
Kiyoshi Sawada, General Secretary of the 8th ISSP, Department of Chemistry, Faculty of Science, Niigata University, Niigata 950-21, Japan. Tel.: +81 25 262 6265, fax: +81 25 262 6116, e-mail: issp@sc.niigata-u.ac.jp

Chemical education

9–14 August 1998
15th International Conference on Chemical Education: Chemistry and Global Environmental Change, Egypt.
Prof. Saad S.M. Hassan, Department of Chemistry, Faculty of Science, Ain Shams University, Cairo, Egypt. Fax: +20 2 831836, e-mail: iupac15@asunet.shams.eun.eg

Carbohydrate symposium

9–14 August 1998
19th International Carbohydrate Symposium, San Diego, CA, USA.
Prof. David A. Brant, ICS 98 Symposium Secretariat, Department of Chemistry, University of California, Irvine, CA 92697-2025, USA. Tel.: (714) 824-8976, fax: (714) 824-1372, e-mail: ics98@uci.edu, Web Page: http://www.ics98.uci.edu

Physical organic chemistry

16–21 August 1998
14th International Conference Physical Organic Chemistry, Florianopolis, Brazil.
Prof. Eduardo Humeres, Department of Chemistry, Universidade Federal de Santa Catarina, Campus Univeritario-Trindade, 88040-900 Florianopolis, Brazil. Tel.: +55 48 231 9219, fax: +55 48 231 9711/231 9688, e-mail: humeres@mbox1.ufsc.br

Co-ordination chemistry

31 August–4 September 1998
33rd International Conference on Co-ordination Chemistry, Florence, Italy.
Dr Ivano Bertini, Chairman, University of Florence, 33rd ICCC Secretariat, Department of Chemistry, FLorence 50121, Italy. Tel.: +39 55 2757 549, fax: +39 55 2757 555, e-mail: ICCC@rics.lrm.fi.cnr.it

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Electrochemistry

13–18 September 1998
International Society of Electrochemistry, Kitakyushu, Japan.
Prof. Erika Kalman, 1025 Budapest, Central Research Institute for Chemistry of the Hungarian Academy of, Sciences, Pusztaszeri út 59-67, Hungary. Tel.: +36 1 325 7548, fax: +36 1 325 7509, e-mail: kale@cric.chemres.hu

Chemistry of germanium, tin and lead

20–25 September 1998
9th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin & Lead (ICC0C GTL-9) Melbourne, Australia.
Prof. Dainis Dakternieks, Deakin University, Biological & Chemical Sciences, Geelong 3217, Australia.

Supramolecular science and technology

27 September–3 October 1998
1st International Conference on Supramolecular Science & Technology, Zakopane, Poland.
Marek Pietraszkiewicz, Chairman of the ICSS&T, Polish Academy of Sciences, Kasprzaka 44/52, 01224 Warsaw. e-mail: pictrasz@ichf.edu.pl

Chemistry of natural products

11–16 October 1998
21st IUPAC symposium on the Chemistry of Natural Products, Beijing, China.
Prof. Xiao-Tian Liang Institute of Materia Medica Chinese Academy of Medical Sciences 1 Xian Nong Tan Street Beijing 100050 China. Tel.: +86 10 6 301 3366-245, fax: +86 10 6 301 7757.

Excitonic processes in condensed matter

2–5 November 1998
Third International Conference on Excitonic Processes in Condensed Matter, Boston, MA, USA/
Prof. William M. Yen, Department of Physics and Astronomy, University of Georgia, Athens, GA, USA. 30602-2451. Tel.: (706) 542-2491, fax: (706) 542-2492, e-mail: wyen@hal.physast.uga.edu

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes (IFD4), Osaka, Japan.
Prof. Yasuhiko Shirota, Osaka University, Faculty of Engineering, Yamadaoka, Suita, Osaka 565, Japan. Tel.: 81 6 879 7364, fax 81 6 877 7367, e-mail: shirota@ap.chem.eng.osaka-u.ac.jp

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It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, Director General, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: [254] 2 521003, fax [254] 2 520023 e-mail: p.sanchez@cgnet.com

Polymerization methods

12–15 July 1999
Advances in Polymerization Methods, 39th Microsymposium, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6-Petriny, Czech Republic. Tel.: +42 2 360341, fax: +42 2 367981, e-mail: sympo@imc.cas.cz

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. Tel.: +44 (151) 794, fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6-Petriny, Czech Republic. Tel.: +42 2 360341, fax: +42 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Sendai 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911, e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium, SAC 99, Dublin, Ireland.
Prof. Malcolm R. Smyth, School of Chemical Sciences, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 7045308, fax: +353 1 7045032, e-mail: smyth@ccmail.dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777, fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MMIC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169, Japan. Tel.: 81 3 5286 3120, fax: 81 3 3209 5522.

2000

High temperature materials chemistry

4–10 April 2000
International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), D-52425 Julich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Bio-organic chemistry

First quarter 2000
5th IUPAC Symposium on Bio-Organic Chemistry, (ISBOC-V), New Delhi, India.
Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 (471) 491 459, fax: +91 (471) 490 186.

Macromolecules

9–14 July 2000
International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Dr Stanislaw Penczek, 90-363 Lodz, Sienkiewicza 112, Poland. Tel.: +48-42 819815, fax: +48-42 847126.

Natural products

1 September 2000
22nd International Symposium on Chemistry of Natural Products, Sao Paulo, Brazil.
Prof. Dr Otto R. Gottlieb Rua 5 de julho 323, Apt. 1001, 22051-030, Rio de Janeiro 22051-030, Brazil.

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV, Postfach 150104, Theodor-Heuss Allee 25, D-60061 Frankfurt/Main, Germany. Tel.: +49 (69) 7564 205, fax: +49 (69) 7564 302.

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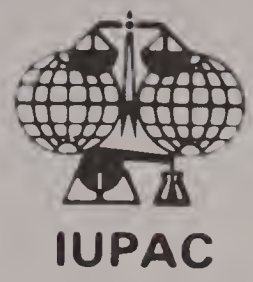

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Union of Yugoslav Chemical Societies

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Blackwell Science

0193-6484(199803)20:2:1-C

Printed in Great Britain by Alden, Oxford

ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

1998, Vol. 20, No. 3 (May)

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Blackwell Science

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The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

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All correspondence to be addressed to The Editor, Chemistry International, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Telephone: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org and http://www.iupac.org

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Front cover: Prague Conference Centre (see this issue, pages 77–80).

International Union of Pure and Applied Chemistry

Report to the Executive Committee

by the Strategy Development and Implementation Committee

Proposed changes in organization and management of IUPAC scientific activities

The final report by the Strategy Development and Implementation Committee (SDIC) is given in the following pages The IUPAC Executive Committee has accepted the SDIC report and voted unanimously to recommend to the Bureau that the proposals by the SDIC be adopted. The *Strategic Plan, 1998–99.* has already been approved by the IUPAC Executive Committee. The recommended changes in organization and management that will occur are far-reaching and will alter many aspects of the IUPAC structure and operations. I strongly believe that these proposals should be implemented and will enable the Union to play a major role in the development of chemistry in the 21st century.

Under the SDIC proposals, the seven Division Committees will assume direct responsibility for initiating, developing and managing the Union's scientific work, with each scientific project carried out by a short-term Task Group. Allocation of financial resources is to be tied directly to individual projects, and meaningful dates are to be established for completion of projects. These proposals thus envision a structure that is far more dynamic than the present one with 37 relatively permanent Commissions. In fact, the SDIC recommends that Council be asked in 1999 to terminate all existing Commissions at the end of 2001 and permit a smaller number of new Commissions to be formed as planning and advisory bodies when needed.

The SDIC has considered in considerable detail just how ideas for new projects can be generated and individuals recruited to carry out the projects in the absence of a large cadre of Commission members. We expect to reach out to the world-wide chemistry community and anticipate that National Adhering Organizations will become more actively involved in project generation and in suggesting scientists to serve on Task Groups. During the next three years the current Commissions, in collaboration with their Division Committees, will play a central role in defining areas of science that need study by IUPAC and in proposing specific projects and individuals who might carry out such projects.

The Bureau will be asked to approve in September a major new policy for IUPAC's future development. Prior to that time it is important that we have a wide-ranging discussion within the Union of the details and ramifications of these proposals. The report by the SDIC is comprehensive and provides detailed explanations for the recommendations that are made. Nevertheless, there are undoubtedly some aspects that have not been considered and some consequences of the proposals that have not been fully appreciated. We begin now to solicit views from the National Adhering Organizations that provide the resources for our activities; from the many people who carry out the work within the Union; and from the world-wide community of chemists and the chemical industry, whom we ultimately serve.

I would appreciate receiving your comments and questions. They should be submitted through the Secretariat, either by e-mail: secretariat@iupac.org, or at the address given on the inside front cover.

Joshua Jortner,
President, IUPAC

Executive Summary

The Strategy Development and Implementation Committee (SDIC) was established by the IUPAC Executive Committee (EC) on 7 April 1997 with the following charge:

1 Develop long-range goals or mission statements, based initially on the recommendations in the 1997 Vice-President's Critical Assessment.
2 Propose strategies for achieving these goals.
3 Examine the feasibility of converting the bulk of IUPAC's scientific work to a project-driven system, with time-limited Commissions, as expressed in the concept endorsed by the EC.
4 Propose specific means by which this concept (if found feasible) can and should be implemented, with desirable target dates.

The SDIC completed tasks 1 and 2 at the end of 1997 and submitted a proposed Strategic Plan to the Executive Committee (EC) in January 1998. This Plan, which is also presented and described in this report, was approved by the EC and has been widely disseminated. The Strategic Plan provides a succinct statement of IUPAC's Mission, a statement of 10 long-range Goals

and a set of Strategies to achieve each Goal. The Plan constitutes a declaration of the Union's global policy. It also provides a guide to the development of operational programs and a set of criteria against which to evaluate the accomplishments of IUPAC bodies.

Tasks 3 and 4 refer to changes in operational policies and procedures that would significantly change many aspects of the way in which the Union carries out its scientific activities. Since these activities are carried out primarily through the Divisions and Commissions, the SDIC has directed its attention to these bodies, not to the Bureau and Standing Committees, which have responsibilities in other areas. The SDIC has concluded that it is feasible to convert the Division/Commission structure and operations into one that focuses largely on specific projects carried out by time-limited bodies. However, the SDIC believes that successful operations in the future require the implementation of a number of concurrent changes. The SDIC has developed an integrated program to refocus IUPAC's efforts, to insure continuing quality and expertise in its scientific leadership, and to involve the world-wide chemistry community in the development and conduct of the Union's projects.

The following steps must be taken in concert to achieve the desired goals:

- Each Division Committee will become the clear focus in its branch of chemistry for the initiation of scientific efforts and for the development and management of individual projects. The duties of the Division Committees will be redefined; the membership augmented as needed to provide sufficiently broad scientific expertise; and the mechanism for nominating members of Division Committees modified to insure a continuing source of top-notch leadership drawn widely from the world's chemists.
- Ideas for projects will be solicited widely from National Adhering Organizations, national and regional chemical societies, industrial organizations and the general chemistry community. Proactive efforts will be made to assess needs for IUPAC action through presentations and discussions at IUPAC-sponsored symposia and other specialized meetings in the chemical sciences.
- It is expected that most projects will be carried out by Task Groups appointed for the (usually short-term) duration of the project and funded adequately to permit completion of the project in the planned time frame.
- The professional staff of the Secretariat will be developed to provide assistance to the Task Groups as needed and to assist in seeking ideas for IUPAC projects. The Secretariat staff will help to develop new projects and will actively seek outside funding when appropriate.
- In 1999 at Berlin, Council will be asked to amend Bylaw 4.307, effective 1 January 2002, to remove the 'right' of Titular Members to receive funds for travel and subsistence. Expenses will henceforth be paid as needed to accomplish particular objectives—e.g. to plan a program, provide advice to the Division Committee or carry out a project. By eliminating these automatic expenditures, the SDIC believes that a significant fraction of the $525 000 budgeted for each General Assembly and funds allocated for 'even year' meetings of Commissions can be redirected to high priority projects.
- In 1999 at Berlin, Council will be asked to terminate all existing Commissions on 31 December 2001. Requests by the Divisions to form new Commissions, for operation in 2002 and beyond, primarily as long-range planning and advisory bodies, will be considered by the Bureau and by Council in 1999 and 2001.

The SDIC anticipates that this report will be widely read and discussed within IUPAC and by its National Adhering Organizations. Hence, the body of the report and the appendices contain considerable background information. Furthermore, the presentation of recommendations is often rather detailed in order to provide an indication of the thorough discussion by the SDIC and of the rationale for each proposal. The financial implications of the Strategic Plan and the recommended operational changes are discussed and shown to require no additional resources.

A more succinct presentation of the recommendations and a timetable for actions is given on pp. 22–24. The SDIC recommends that the EC approve this program, request comments from IUPAC bodies and the Union's National Adhering Organizations, modify the details as needed as a result of comments received, and submit the proposal to the Bureau for action. The Bureau will be asked to endorse this program in September 1998 and set in motion the steps outlined above.

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Report to the Executive Committee by the Strategy Development and Implementation Committee

The Strategy Development and Implementation Committee (SDIC) was established by the IUPAC Executive Committee (EC) on 7 April 1997 as an *ad hoc* committee with the charge given below and instructions to report to the EC before its meeting in April 1998. Members of the SDIC were appointed by the President of IUPAC, as described below. This document constitutes the final report by the SDIC in fulfillment of its mission.

Formation of the SDIC

Background

During 1996 and 1997, the Officers of IUPAC undertook efforts to solicit opinions from the world-wide chemistry community on the future role of IUPAC. Out of the conferences held in the USA in June 1996 and in London in February 1997 (later reinforced by the conference held in Singapore in June 1997), there emerged many specific ideas for future developments of the Union, but there were three overriding major points: (i) IUPAC needed to develop an updated Mission in order to regain relevance to the international community of chemistry and the chemical industry; (ii) the Objectives given in IUPAC Statute 1 should be augmented by specific, achievable Goals; and (iii) IUPAC should broaden the geographic base of the Union's activities to achieve its full potential as a global organization. These concepts formed part of the underpinning of the statutory Vice-President's Critical Assessment (VPCA), and Vice-President Jortner proposed a number of specific goals. In April 1997 the EC endorsed the general thrust of these proposed goals but recognized that they needed to be considered carefully and fleshed out into a Strategic Plan for the Union.

Meanwhile, the organization and management of IUPAC's scientific work had been the subject of extensive discussion and debate within the Union over a period of several years. There was general recognition that the relatively static Commission structure is outdated and that it is inadvisable to spread IUPAC's limited resources among seven Divisions and 37 Commissions, which attempt to carry out nearly 500 projects concurrently. Various proposals had been advanced for restructuring Divisions and Commissions, and great efforts had gone into developing a scientific policy for the Union. Options for restructuring and for allocating resources by project were discussed in detail at the annual Division Presidents meeting in September 1996 and at a special meeting of Division Presidents and Vice-Presidents in March 1997. It was clear that the Divisions wanted and needed more flexibility in managing their programs. Against this background, the Secretary General prepared a paper for the EC meeting in April 1997 that advocated an emphasis on funding projects that would be carried out primarily by time-limited Commissions. After much discussion, the EC endorsed this concept but recognized that the proposed major changes in the organization and management of the Union's scientific work needed considerable further study and analysis.

The EC decided therefore that the separate but related issues of formulating long-range goals and strategies and of implementing the management changes needed to achieve the goals could best be addressed by a single broad-based *ad hoc* committee, the SDIC.

Charge to the SDIC

The charge to the SDIC is as follows:

1 Develop long-range goals or mission statements, based initially on the recommendations in the 1997 Vice-President's Critical Assessment.
2 Propose strategies for achieving these goals.
3 Examine the feasibility of converting the bulk of IUPAC's scientific work to a project-driven system, with time-limited Commissions, as expressed in the concept endorsed by the EC.
4 Propose specific means by which this concept (if found feasible) can and should be implemented, with desirable target dates.

The SDIC is to report to the EC in time for its meeting in April 1998.

Membership

To assure that all facets of the Union's programs would be considered by the SDIC, its membership was drawn broadly—two IUPAC Officers, two Elected Members of the Bureau, one Standing Committee chairman, two Presidents-elect of Divisions, and three outstanding chemists not currently in IUPAC posts but who are familiar with the Union's activities. President Fischli accordingly appointed the following members:

Prof. Joshua Jortner (chairman)
Dr Edwin D. Becker
Prof. Heindirk tom Dieck
Prof. Mostafa El-Sayed
Prof. Robert Gilbert
Dr Alan Hayes
Prof. Upendra K. Pandit
Prof. Pieter Steyn
Prof. Leiv K. Sydnes
Prof. Andrea Vasella
Dr John W. Jost (staff support)

A secondary, but important, consideration was geographic diversity. The SDIC members come from North America, the Asia-Pacific area, the Middle East, Africa and Europe. Appendix 1 gives institutional affiliation and IUPAC office (if applicable) for each member of the SDIC.

Committee Meetings

The SDIC has held three full-day meetings (24 June 1997; 21 November 1997; and 24 January 1998) and a short meeting at the General Assembly in Geneva (25 August 1997). Participation was excellent. Although not all members could attend every meeting, an average of eight of the 10 members were present at each meeting, and absentees frequently sent written comments in advance. All members contributed actively to the discussions, and a great many ideas were exchanged by e-mail. The findings and recommendations given here represent the result of ideas obtained from many sources, which were subjected to careful analysis and much friendly debate within the Committee.

The SDIC members were quite sensitive to input from many sources outside the Committee. Comments and ideas from the Division Presidents meetings listed above and at the General Assembly in Geneva were important. Views expressed by Bureau and Council members in Geneva and by Commission officers and members during a number of informal meetings provided valuable sources of information. The semi-final draft of the Strategic plan was circulated to the Bureau for comments, and several suggested improvements in wording were subsequently incorporated into the final version.

Strategic plan

Although all aspects of the Committee's work were dealt with concurrently, the SDIC gave priority to completion of a Strategic Plan for the 1998–99 biennium. The recommended Plan was submitted to the EC and approved by that body on 23 February 1998.

The goals proposed in the VPCA (see Appendix 2), along with papers prepared for the initial SDIC meeting by Profs. Pandit and Steyn (also in Appendix 2), served as the starting point but were modified extensively as a result of discussion by the Committee. The SDIC decided that the Strategic Plan should articulate the scientific policy of the Union in a concise manner that will guide the development of operational plans by the Divisions and other IUPAC bodies. The document should also be valuable in explaining to chemists world-wide and to potential funding organizations just what IUPAC is and what roles it now plays and expects to play in the advancement of the chemical sciences. A preamble provides a short background statement, primarily for use outside the Union.

The Plan itself begins with a brief Mission Statement and is built around a set of long-range goals. The SDIC discussed at length the particular number and statement of the goals and decided that the 10 goals listed seemed to be the smallest number that clearly encompass the broad range of the Union's activities. The first seven goals express IUPAC's commitment to serving the global chemistry community, while the last three describe actions that should be taken to enhance the scope, image and management of the Union itself. Under each goal there are several strategic thrusts. These explain aspects of the goal where necessary and point out specific areas in which IUPAC can realistically develop or continue programs to achieve the goal.

The Plan concludes with a short section on Implementation and Updating. This portion has deliberately been kept brief in recognition of the potentially broad

distribution of the Plan outside IUPAC. The Secretary General, in consultation with other Officers, will develop and present to the EC a more detailed proposal that discusses the relation between the VPCA and the implementation and updating of the Strategic Plan. It will suggest procedures for soliciting views and approving updates and for assigning responsibilities for implementation of various aspects of the Plan.

The full text of the Strategic Plan for 1998–99 is given on the following pages.

IUPAC Strategic Plan—1998

The International Union of Pure and Applied Chemistry (IUPAC) was formed in 1919 by chemists from industry and academia. Over nearly eight decades the Union has succeeded in fostering world-wide communications in the chemical sciences and in uniting chemistry—academic, industrial and government—in a common language. IUPAC has long been recognized as the world authority on chemical nomenclature, terminology, standardized methods for measurement, atomic weights and many other critically evaluated data. The Union continues to sponsor major international meetings that range from specialized scientific symposia to CHEMRAWN meetings with societal impact. During the Cold War, IUPAC became an important instrument for maintaining scientific and technical dialogue among the world's chemists.

With the major changes that have occurred world-wide in chemistry and the chemical industry, it is important that IUPAC examine its activities and define its role as the organization principally responsible for promotion of the chemical sciences internationally. Following a series of meetings to obtain input from leaders in chemistry on four continents, IUPAC has redefined its mission and established goals and strategies to guide its approach to the shaping of the chemical sciences and the service of chemistry in a rapidly changing world.

Mission statement

IUPAC's mission is to advance the world-wide aspects of the chemical sciences and to contribute to the application of chemistry in the service of Mankind. In so doing, IUPAC promotes the norms, values, standards and ethics of science and advocates the free exchange of scientific information and unimpeded access of scientists to participation in activities related to the chemical sciences.*

*In recognition of the role of chemistry as a central science in a wide range of fields, the term 'chemical sciences' is used here to refer to chemistry, broadly defined, and to those disciplines and technologies that make significant use of chemistry.

Long-range goals

To further its mission, IUPAC has established a set of long-range Goals and has formulated strategic thrusts that are aimed at achieving each of the Goals. The Goals are summarized here, and the complete set of Goals and Strategic Thrusts for the current biennium is given on the following pages.

1 IUPAC will serve as a scientific, international, non-governmental body in objectively addressing global issues involving the chemical sciences Where appropriate, IUPAC will represent the interests of chemistry in governmental and non-governmental forums.
2 IUPAC will contribute to the advancement of research in the chemical sciences throughout the world.
3 IUPAC will assist chemistry related industry in its contributions to sustainable development, wealth creation and improvement in the quality of life.
4 IUPAC will facilitate the development of effective channels of communication in the international chemistry community.
5 IUPAC will promote the service of chemistry to society in both developed and developing countries.
6 IUPAC will utilize its global perspective to contribute toward the enhancement of education in chemistry and to advance the public understanding of chemistry and the scientific method.
7 IUPAC will make special efforts to encourage the career development of young chemists.
8 IUPAC will broaden the geographical base of the Union and insure that its human capital is drawn from all segments of the world chemistry community.
9 IUPAC will encourage world-wide dissemination of information about the activities of the Union.
10 IUPAC will assure sound management of its resources to provide maximum value for the funds invested in the Union.

Goals and Strategic Thrusts—1998–1999

To further its mission, IUPAC has established a set of long-range Goals and has formulated strategic thrusts that are aimed at achieving each of the Goals. These strategies are intended to guide the development of operational plans and the setting of priorities for optimal use of the Union's resources, both human and financial.

1 *IUPAC will serve as a scientific, international, non-governmental body in objectively addressing global issues involving the chemical sciences. Where appropriate, IUPAC will represent the interests of chemistry in governmental and non-governmental forums.*

- IUPAC will conduct projects pertaining to the chemical aspects of important issues of international concern. In addition to projects initiated within IUPAC, input for new projects of scientific and industrial importance may come from international governmental and non-governmental bodies and from appropriate public groups. Examples are the series of CHEMRAWN conferences, the recent *White Book on Chlorine* and the studies of methods for disposal of chemical weapons. IUPAC will not undertake projects that cast it in the role of policy development or as an advocate for special interest groups.
- Collaborations with international governmental bodies, such as UNESCO and the World Health Organization, should continue and be strengthened. The IUPAC/UNESCO International Council for Chemistry will serve as the central forum for planning and coordinating work with UNESCO. Collaborations with other individual scientific Unions, with international scientific societies, and with the International Council of Scientific Unions (ICSU) should be enhanced to plan and carry out projects of an interdisciplinary nature.

2 *IUPAC will contribute to the advancement of research in the chemical sciences throughout the world.*

- The importance of standardized nomenclature, symbols, terminology and methodology is critical to communication in the chemical sciences. To remain the recognized international authority in this area, IUPAC must ensure that important problems are recognized and treated fairly and expeditiously. Collaborations with national and regional chemistry societies, with governmental bodies and with commercial information organizations should be augmented. Greater efforts should be made to encourage adoption of IUPAC recommendations through contacts with authors, editors and publishers.
- The biennial IUPAC Congress is intended to present the most outstanding relevant developments in modern chemistry and to inspire high research standards. Future Congresses should adhere to this principle.
- An assessment should be made of IUPAC sponsorship of specialized symposia in order to strengthen this well accepted program. New significant research fields in chemistry should be highlighted by the initiation of relevant high quality symposia.
- Special attention should be devoted to improving the quality of the Union's scientific publication program. Bibliometric analysis and other criteria can be used to assess the impact of IUPAC books and the journal *Pure and Applied Chemistry*. IUPAC should take advantage of advances in electronic publishing methods to ensure high quality publications that are disseminated in a rapid and cost-effective manner.
- Policies should be developed for IUPAC's role in the preparation and dissemination of critically evaluated databases, from atomic weights to thermodynamic and other chemical data.

3 *IUPAC will assist chemistry related industry in its contributions to sustainable development, wealth creation and improvement in the quality of life.*

- IUPAC is unique among the International Scientific Unions in including within its scope a large industrial base. IUPAC is often perceived as being oriented primarily toward academic institutions, but industry benefits equally from much of the Union's work in standardized symbols, nomenclature and terminology, as well as from critically evaluated data. Greater efforts should be made to demonstrate the ways in which IUPAC serves industrial needs directly and indirectly. In addition to the present links provided by the Committee on Chemistry and Industry, serious efforts are needed to engage leaders in the chemical industry and national and international industry associations in dialogue to explore ways in which IUPAC and industry can enhance mutually beneficial interactions.
- IUPAC should be particularly alert to projects that help develop the scientific basis for practices and procedures that protect society while encouraging responsible and sustainable development. Such projects may be initiated in the basic chemistry Divisions, as well as in the mission-oriented Divisions [Chemistry and the Environment, and Chemistry and Human Health].

4 *IUPAC will facilitate the development of effective channels of communication in the international chemistry community.*

- The vast potential of the Internet should be utilized to enhance information transfer between IUPAC and chemists in many countries. The Affiliate Member Program already provides a base, which should be expanded many-fold.
- *Chemistry International* should be developed as a forum for highlighting important problems and advances in chemistry and for discussion of science policy and global issues in chemistry.
- Increased efforts should be made to provide information on IUPAC activities and news about important matters of international chemistry to major scientific journals and national and regional chemistry news magazines, which routinely reach hundreds of thousands of chemists world-wide. Feedback should be encouraged.

5 *IUPAC will promote the service of chemistry to society in both developed and developing countries.*

- CHEMRAWN Conferences have long provided the principal mechanism for IUPAC to address issues that transcend pure science and have important socio-political aspects. Such Conferences should continue to be promoted, along with follow-up Future Action Programs.
- IUPAC bodies should continue to be alert to projects on matters of societal importance (e.g. chemical weapons disposal, environmental cleanup, biodiversity) that depend heavily on chemical sciences and technology.
- Within its limited funds, IUPAC should consider ways to foster chemistry in developing countries. In many instances, IUPAC's initiative and scientific expertise has been paired with outside funding sources (e.g. recent UNESCO-supported work in the least developed countries and the UNESCO/UNIDO/IUPAC program in chemical safety) to produce valuable results, and this model should be further elaborated.

6 *IUPAC will utilize its global perspective to contribute toward the enhancement of education in chemistry and to advance the public understanding of chemistry and the scientific method.*

- Scientists everywhere recognize the critical role played by formal and informal education at all levels, from kindergarten through graduate school, not only for future scientists but also for the general public. The problems associated with such educational programs are enormous. Educational systems, administration and curricula vary drastically by country, locality and individual school and teacher. IUPAC cannot hope to make an impact on detailed curricula or outreach activities in individual countries and localities, but it may be able to complement the efforts of national chemical societies and to coordinate exchange of information. IUPAC should examine carefully what long-range role it can realistically play in international science education and develop appropriate policies. Meanwhile, a number of specific activities can usefully be initiated or continued, as described below.
- The Committee on Teaching of Chemistry (CTC) has been effective in carrying out its program on exchange of information on teaching methods, equipment, etc. CTC should continue to serve as the focal point for IUPAC's programs in this area, but its programs should be broadened. In addition, IUPAC Divisions should be invited to develop complementary projects to enhance education at all levels and to coordinate them with CTC.
- IUPAC should cooperate in whatever ways are feasible with the major new program established by ICSU on Capacity Building in Science, which will endeavor to disseminate information on science teaching in primary schools and science education for the public.

7 *IUPAC will make special efforts to encourage the career development of young chemists.*

- It is apparent that the future development of the chemical sciences lies largely in the hands of the younger generation of scientists, who often encounter severe obstacles in an era of constrained resources. IUPAC should develop programs that are perceived by 'younger chemists' to be helpful to them and feasible for the Union to undertake within its resources. Young chemists from developing countries who return after advanced training elsewhere may benefit particularly from these programs and from exchange of information with IUPAC via the Internet.
- IUPAC should strongly encourage organizers of the IUPAC Congress and IUPAC-sponsored symposia to provide travel support for younger scientists and to include younger scientists among the invited lecturers.
- IUPAC Commissions and other bodies should make special efforts to recruit well qualified younger scientists for their projects. Several National Adhering Organizations (NAOs) now provide travel support for younger scientists to attend the General Assembly as Associate Members, National Representatives or Observers; other NAOs should be encouraged to follow this lead.

8 *IUPAC will broaden the geographical base of the Union and insure that its human capital is drawn from all segments of the world chemistry community.*

- The Union is taking active steps toward globalization of its activities with regional meetings and solicitation of input from the world's chemists.
- The 42 National Adhering Organizations and 14 Observer Organizations that currently comprise IUPAC are broadly distributed throughout the world, but there are several geographic regions with little or no representation in the Union and a number of countries with substantial academic and industrial developments in chemistry that do not adhere to the Union. IUPAC should encourage such countries to apply for membership. In addition, IUPAC should stimulate less developed countries to seek Observer status.
- The Union has long had a formal policy of 'fair geographical representation' among Elected Members of the Bureau and informally strives to obtain geographic diversity among IUPAC and Division Officers. While maintaining the focus on expertise, IUPAC's scientific bodies should make efforts to recruit younger chemists, women chemists and chemists from recently developed regions, including in some instances countries that are not yet full Members of the Union.

9 *IUPAC will encourage world-wide dissemination of information about the activities of the Union.*

- Much of the valuable work done by IUPAC bodies is published only in *Pure and Applied Chemistry* or in specialized books and journals. Although such formal and archival publication is essential, greater efforts should be made by individual IUPAC bodies, the Secretariat and the NAOs to disseminate this information as early and as widely as possible to the relevant scientific community. In many instances, high quality reports from symposia, workshops and Commission activities should be prepared not only as formal scientific publications but also as semi-popular documents emphasizing applications. For topics that warrant attention in the popular scientific press, carefully drawn news releases are needed.
- Contacts with major national chemical societies, regional chemistry federations, industrial associations, and government/industry/university consortia should be expanded to ensure that these organizations are fully aware of IUPAC activities and can provide credit to the Union where its activities complement theirs.
- Improved two-way communication with NAOs concerning science policy, planning and implementation of projects and other activities is needed. Special efforts should be made to prepare suitable material describing IUPAC programs and accomplishments in a form that will assist NAOs in recruiting Company Associates.

10 *IUPAC will assure sound management of its resources to provide maximum value for the funds invested in the Union.*

- The Union can undertake its many activities only because of stable financial support from its National Adhering Organizations, which in turn usually obtain their resources from government and/or industrial sources. IUPAC has a continuing responsibility to demonstrate to its sponsors that all relevant management tools, including the use of modern information technology, are employed to maximize productivity in the administration of the Union.
- IUPAC should encourage philanthropic donations to the Union's endowment. With continued wise investment strategies that assure maximum return consistent with reasonable safety, the endowment and operating reserves will provide a continuing source of funding that augments and leverages the subscriptions from the NAOs.
- Although the purpose of the IUPAC publications program is the dissemination of scientific information, this program has for a number of years provided substantial income to help support IUPAC's other work. As the program is redirected in the era of electronic publishing, efforts should be made to continue to have publications as a source of funds, rather than a drain on the Union's resources.
- Officers of IUPAC bodies and the Secretariat should continue to be alert to possible sources of funds for specific projects from outside groups (e.g. UNESCO, ICSU, charitable foundations and industry) to augment the base funds provided by NAO subscriptions.

Implementation and updating of the Strategic Plan

The Strategic Plan is intended to articulate the scientific and operational policy of IUPAC, providing overall policy guidance to the IUPAC Divisions and Standing Committees for assistance in the development of coordinated programs to advance the Union's mission. This Plan should not impede or replace initiatives at all levels within the Union. The Council, Bureau and Executive Committee will formulate procedures for ensuring that operational programs will be drafted and resources allocated within the context of the Strategic Plan, that responsibilities will be assigned for implementation of programs, and that outcomes will be evaluated.

Each biennium the strategic thrusts will be analyzed and updated as needed. The long-range goals may also be revised when appropriate, but probably on a longer time frame.

Organization and management of scientific work

Most of the Union's core scientific programs have been built around the work carried out in its seven Divisions and a large number of Commissions (currently numbering 37), with support from the Standing Committees and several Divisional subcommittees. With limited financial resources from IUPAC, principally to defray costs of travel and administrative expenses, and far larger in-kind support from their employers, the members of these IUPAC bodies voluntarily devote enormous amounts of time to advancing chemistry. Their accomplishments in obtaining international agreement on nomenclature, symbols, terminology and methodology have produced a world-wide language of chemistry. Many of these groups continue to establish values for critically evaluated chemical data, from precise atomic weights to thermodynamic properties, while others provide physical and chemical characterization of various substances. Some IUPAC bodies are concerned with criteria for training and education in specific branches of chemistry, and many bodies traditionally organize high quality international symposia in a wide range of chemical fields.

In spite of the widely acclaimed past accomplishments of the Union and its continuing successes in very

many areas, increasing concern has been expressed by the world-wide chemistry community and by several of IUPAC's National Adhering Organizations (NAOs) as to the overall impact of the Union's programs on contemporary problems in chemistry. Over the last decade there has been much introspective evaluation of the Union's scientific work, frequent calls to modify the structure of the Divisions and Commissions, and imposition of a large number of requirements designed to assure that only projects of high quality and high priority are undertaken. The results of these efforts have been largely disappointing in that they have resulted in little change in the organization and management of the Union's work. Moreover, these continuing efforts to change first one, then another IUPAC body have proved frustrating and sometimes demeaning to many of the dedicated individuals who voluntarily carry out this work.

Following detailed discussions among the IUPAC Officers and the Division Presidents and Vice-Presidents during 1996–97, the Secretary General presented an analysis of the problems and made recommendations for major changes in both organization and management of the scientific activities of the Union. The Secretary General's Report [SGR] was presented to the Executive Committee in April 1997 and after considerable discussion the basic concepts were accepted and the SDIC was assigned the task of assessing the feasibility of specific proposals and recommending in detail how the desired changes could be accomplished. The full SGR is given in Appendix 3. The Report has been widely disseminated within IUPAC bodies and among the Union's NAOs, and many comments on the Report have been provided to the SDIC to help guide its work and recommendations.

The SDIC's analysis of the present organization and of the means by which its projects are initiated and managed has highlighted a number of factors that are of concern, as follows:

- Responsibility for initiation, development and management of IUPAC's projects is divided among seven Division Committees and 37 Commissions.
- Largely because of this highly decentralized structure and resulting fragmentation of areas of responsibility, it has frequently proved difficult, time-consuming and sometimes impossible to develop interdisciplinary projects in spite of the acknowledged importance of such projects to the future of chemistry and to the future of IUPAC.
- About half of the Union's limited financial resources are devoted to supporting the Commissions, with no clear relation between resource utilization and specific projects. Although individual expenditures are quite modest, collectively the sums are significant. A large fraction of the approximately $525 000 cost of a typical General Assembly pays for travel and subsistence of Titular Members, and much of the Divisions' collective biennial budgets of about $420 000 is devoted to meetings of Commissions in the years between General Assemblies.
- There has been a proliferation of projects (numbering more than 400 in the last biennium) of varying quality and urgency, often approved routinely without stringent outside review. There is little incentive to limit the number of projects or give serious consideration to priorities since there is virtually no relation between the importance of a project and the (often meager) financial resources allocated to it.
- Ideas for projects usually arise within Commissions, sometimes because the Commission has established a clear international need, at other times simply because an individual Member is interested in the subject and willing to devote time to pursuing the project. Overall, there has been relatively little formal effort to solicit views from NAOs, chemical societies and the world-wide chemistry community. Refereeing of proposed projects outside IUPAC has been spotty, and retrospective evaluation has been uneven.
- Although the Secretariat has, over the years, done an excellent job of providing administrative and logistical services to all IUPAC bodies, it has not been staffed to provide professional help to groups carrying out scientific projects. Even very modest professional staff assistance could be valuable in developing projects and in insuring their timely completion.
- The process by which Members of Commissions and Division Committees are selected has long given rise outside the Union to the view expressed in 1979 that IUPAC is a 'charmed circle'. Although the Union has made efforts to limit the length of terms in order to allow more people to participate, the procedure by which Members elect their own successors with no formal outside input strengthens the perception of an inward-looking organization.

The Secretary General's Report addressed many of these perceived deficiencies and advocated the conversion of most of the Union's scientific activities 'from a primarily static Commission structure to one that is largely based on time-limited Commissions formed to carry out specific, well defined tasks.' The Executive Committee approved this concept but recognized that many details needed to be examined. The SDIC was asked [Tasks 3 and 4] to determine whether such a radical change in IUPAC operations would be feasible and if so to provide specific recommendations on how to achieve this objective.

The SDIC concludes that it will be feasible to reorient much of the Union's scientific work to a project-driven

system carried out by short-term Task Groups that report to Division Committees, with much less emphasis on long-term Commissions. However, implementation will require adoption of an integrated program, as described below. The time frame for implementation has been carefully thought out in order to move the Union forward as rapidly as possible but to allow adequate time for completion of existing projects and for phased conversion from the present Division/Commission structure to one that is more dynamic.

Responsibilities of Division Committees

One key element of the SDIC proposal is the consolidation within the Division Committees of the responsibility for organization and management of both continuing programs (such as symposia) and short-term projects. These Committees and their Officers will provide the scientific leadership of the Union. They must be carefully chosen to ensure that each Committee has the necessary vision, breadth and expertise to seek out promising areas for IUPAC involvement, to select the highest quality proposals and to manage the implementation of projects.

Bylaw 4.1 (see Appendix 4) describes the role of Division Committees in some detail, largely in terms of structure and process (membership and size, elections, limitations of authority, reports, Committee meetings, etc.). The functions of the Division Committee emphasize its administrative role in forming and dissolving Commissions and as an intermediary between Commissions and the Bureau. However, the Bylaws provide broad (if somewhat nebulous) authority to the Division Committee 'to plan and organize scientific meetings and other activities...' and 'to prepare a budget for the Division...' *The SDIC proposes that the Bureau promulgate a policy that builds on the statutory framework and makes it clear that the Division Committee is to be the focus of scientific work in the Division and has the overall responsibility itself for initiating, developing and managing the work of the Division.*

As described below, the Division Committee will be expected to select scientific Task Groups to carry out individual projects and may appoint advisory groups as needed. Although the proposed policy is formulated in terms of each Division Committee individually, the SDIC believes that interdisciplinary activities will be of increasing importance; hence, each Division Committee must be charged with making positive efforts to initiate interdisciplinary projects and to work collegially with other Division Committees to provide effective development and management of such projects.

Election of Division Committees and Division Officers

Bylaw 4.1 specifies that the Division Committee is to be elected by all Members of the Division (Titular and Associate), i.e. the members of all Commissions in that Division plus members of the existing Division Committee. With long-range changes in Commission structure as proposed below, it may eventually be necessary to change the election process, but the SDIC believes that the procedure in the Bylaws need not be altered at present. Bylaw 4.1 provides no guidance on nomination of candidates for Committee Members and Officers, but rather leaves this aspect entirely up to each Division. Here the SDIC believes that specific criteria and procedures are essential to ensure the nomination of candidates who will provide the necessary scientific leadership, breadth of expertise and management skills required of the revitalized Division Committee.

The SDIC recommends that the Bureau be asked in September 1998 to adopt uniform nomination policies and procedures for all Divisions, as given below, to be effective immediately and thus govern the 1999 election process. The Bureau should also formally give Divisions authority to suspend the application of all Division Rules that are in conflict with the Bylaws [as several are now] or with the new policy enunciated by the Bureau. After some experience is gained, the Bylaws and Division Rules should be suitably revised, but that could better wait until later years.

The policy should state the intention of insuring that the Committee will seek members from as broad a segment of the world-wide chemistry community as is consistent with the charge to the Division. The Bylaws already recognize the need to renew the Committee's membership by limiting terms to four years for non-Officers. With the procedures given below, this limitation should ensure that there is a broadly based Committee with a healthy turnover in membership. The Bylaws provide that Officers may serve for an additional 4–6 years, a provision that allows flexibility to provide adequate continuity and experience.

Nominating Committee

The SDIC recommends that each Division President/Division Committee appoint a nominating committee of five members unless the Bureau or EC agrees to an exception. The nominating committee should consist of no more than two current members of the Division Committee and three others chosen for the breadth of their expertise. While two of these three should come from outside IUPAC, it may be desirable in some instances for one member to be from another IUPAC Division. The overall membership should be approved by the EC. Af-

ter consultation with the Division Presidents, the Bureau should establish a timetable for making nominations, including sufficient time to permit the nominating committee to solicit suggestions from inside and outside the Division.

Nominees for Division Committee

The nominees should be widely known and respected scientists from academia, government and industry. If feasible, a journal editor should be included among the nominees. The aim should be to create and maintain a Committee that has scientific stature and breadth. Within these guidelines, each Division and its nominating committee should have considerable flexibility to meet the specific needs for each election --for example, to designate categories of vacancies if desired to ensure diversity in subject matter, geographic distribution, or other characteristics. More than one nominee for each vacancy is desirable but should not always be required. The President of IUPAC should review the list of nominees prior to the election to ensure that the Bureau policy has been followed.

Size of Division Committees

The size of the Division Committee is set by the Bylaws as 10 Titular Members (TMs) unless otherwise specified by the Bureau, plus up to six Associate Members (AMs). At present, the Committees range from seven to nine TMs [except for the Division of Chemistry and Human Health (DCHH), where the Sectional structure adds complexity]. If the Division Committee is expected to be broadly based, 10 TMs seems reasonable as a general rule. However, some Division Presidents spoke very favorably at Geneva about improving the science orientation of the Committee by having the Commission chairmen become part of the Committee. As an interim step toward establishing new Division Committees, a Division might propose that an existing Committee be expanded temporarily in this way. The Bureau should provide flexibility and, on a case-by-case basis, allow the maximum size for each Division Committee to exceed 10 TMs/6 AMs for a specified period.

Division Officers

The Bylaws state that the Division Committee shall elect its Officers from among the current and incoming Committee TMs. The elections are subject to approval by Council, but this retrospective approval is virtually automatic. *The SDIC recommends that, following discussion with the Division Presidents, the Bureau specify a uniform procedure to insure that the nomination of one or more candidates for each Division office is conducted in a thoughtful way, with adequate consultation within the Committee and with the President of IUPAC.* Each Division Committee should choose its own leaders, but the SDIC believes that appropriate advance consultation will strengthen the mandate of the elected Division Officers.

There is currently some variation among the Divisions in the length of the term for each Officer and the practice of succession through different offices. The SDIC does not believe that there is necessarily one 'best' policy, but the Division Presidents should discuss the alternatives and initiate change where desirable. It has been pointed out that some high calibre, busy chemists might be more willing to serve if the period of service is not excessive.

The Bureau and Executive Committee should give special attention to the application of the above recommendations within the current Sectional structure of the Division of Chemistry and Human Health. The SDIC does not believe that it is within the Committee's mandate to make specific recommendations for this unique situation.

Project-driven system

The proposal in the SGR to convert the bulk of IUPAC's scientific work to a project-funded system with primarily time-limited commissions has elicited considerable discussion at all levels within IUPAC. The Division Presidents who have expressed opinions seem to be completely in favor of a project-funded system, and a number of individuals from Commissions also have given a positive response to this concept. In fact, many Commissions already carry out individual projects with short-term Working Groups, usually composed partly or entirely of Commission members, and in some instances modest funds are allocated to specific projects.

The second part of the proposal, 'time-limited commissions,' and its corollary of giving up 'permanent' commissions has elicited considerable concern from most Commission members. The SDIC is well aware of and sensitive to these concerns. Abolishing a single Commission might appear to be tantamount to saying that the sub-field covered by that Commission is of little importance. Moreover, there are questions as to how suitable projects could be generated without a Commission devoted to a particular subject area.

Current status of Commissions

The existence of a more or less permanent Commission in a particular subject area has many virtues: There is a cadre of chemists who have accepted responsibility to think about that area and to develop ideas for useful IUPAC projects. The awarding of the title 'Titular Member' or 'Associate Member' of a Commission often pro-

vides sufficient prestige to enable the individual to obtain his/her employer's approval to devote time to IUPAC work—an important consideration in a company or government laboratory but not generally in academia. Also, the 'Member' designation often permits an individual to obtain financial resources for travel and administrative costs—important in all employment sectors, especially for Associate Members. In addition, the existence of a permanent Commission provides an opportunity for appointment of National Representatives—an important consideration for many NAOs in bringing forward some of their better chemists who might not be widely known.

The SDIC believes that the principal shortcomings of the present system of 'permanent' Commissions are (i) perpetuation of the Commission's membership by self-selection, with only nominal approval at higher levels; (ii) generation of projects largely within a Commission in accord with the interests of its members; and (iii) allocation of a large fraction of IUPAC's budget to maintenance of the Commissions and provision for their meetings, irrespective of the quality, quantity and timeliness of the work carried out by the Commission.

Proposed funding for Commissions

These problems disappear if there are only time-limited Commissions to carry out specific projects, where the project is defined and the Commission membership is chosen by someone or some group outside the Commission. The question addressed by the SDIC was: How can IUPAC best accomplish these goals and yet retain some or all of the advantages listed above for 'permanent' Commissions? The SDIC believes that the answer is to have projects carried out by short-term Task Groups *reporting to the Division Committee*, while permitting a limited number of Commissions to be formed, under strict conditions, as advisory groups that would meet only as needed.

One key aspect in effecting such a change is to break the link between Titular Membership and financial support. This could be accomplished most cleanly by a repeal or modification of Bylaw 4.307:

> Titular Members of Commissions have the right to receive contributions towards travel and subsistence expenses from funds of the Union as authorized by the Treasurer acting on behalf of the Union. Contributions may be made to Associate Members or members of subcommittees on recommendation of the Division or Section President and with the agreement of the Treasurer.

Removing the 'right' to receive contributions changes an entitlement to a discretionary expenditure that is related to the need for particular travel. Rather than having each of its Commissions meet at every General Assembly, a Division Committee could authorize meetings and travel only when necessary. This change in policy would leave permanent Commissions in essentially an advisory role unless some or all members were actively engaged in one or more projects for which funding has been approved. However, such an advisory role can be very important in developing new projects. With modern communications technology, much can be accomplished, even without regular meetings.

Formation and Termination of Commissions

Withdrawal of automatic funding for TMs would not solve the problem of having in perpetuity 37 Commissions on subjects that might not be optimal, even for advisory groups. Experience has shown that it is virtually impossible to terminate a single Commission unless there is almost unanimous agreement among all members of the Commission. The SGR [Appendix 3] gives illustrations dating back to 1955 of efforts by IUPAC Presidents to terminate permanent Commissions. However, Council can be asked to exercise its authority under Bylaw 4.302 [see Appendix 4] not to approve the extension of any current Commission beyond 2001. The SDIC believes that it will be less divisive to the Union and more acceptable to each Commission to have *all* Commissions formally terminated than to try to terminate some and leave others.

Under this plan, Division Committees would examine their needs during the period 1999–2001 and request the Bureau and Council to form new Commissions as needed. These could be long-term (but with a specified term—no more than 8–10 years) to provide continuing attention to a field or to organize or manage a continuing activity, such as a series of symposia. In some instances they could be short-term (2–4 years) to accomplish a specific task for which the prestige of a Commission, not just a Task Group, is needed. For each proposed Commission, the Division Committee would have to make a persuasive case and follow the procedures given in Bylaw 4.301 [see Appendix 4]. To prevent a recurrence of the present situation with a large number of long-term Commissions, the Bureau should go beyond the requirement in Bylaw 4.301 for 'an indication as to the probable duration of the life of the new body' by specifying a lifetime and thus ensuring the automatic termination of the Commission unless positive action is taken to extend its life. The SDIC believes that this can be done at present on the basis of Bureau policy but that eventually Bylaw 4.301 should be modified.

National Representatives

National Representatives (NRs) play an important role in increasing the geographic breadth of IUPAC bodies and permitting the close involvement of individual NAOs

with IUPAC work. Bylaw 4.305 [Appendix 4] defines the participation of NRs in Commissions, and there are many active NRs. Although there is no statutory underpinning, two of the seven Division Committees and several Standing Committees also have NRs.

Under the new structure proposed here, NRs can still participate in any Commissions that are formed, but opportunities may be limited. There should be provision for direct links of NRs to all Division Committees, which will become the centers of scientific activity. Such NRs could provide extremely valuable links to NAOs and thus facilitate the generation of ideas for projects and suggestions for individuals to serve on Task Groups. The SDIC recommends that the Bureau, after consultation with Division Presidents, establish a policy for appointment of National Representatives to Division Committees as non-voting members, and for participation of NRs in the work of the Divisions' Task Groups.

Conversion to a new project-driven system

The SDIC recommends that the Bureau approve and implement a policy of relying on short-term Task Groups to carry out specific projects under the direction of Division Committees. A limited number of long-term Commissions could be formed to advise each Division Committee and augment its breadth of expertise. Three concurrent actions are required, as follows:

1 In September, 1998, the Bureau should approve a policy of providing IUPAC funds for support of approved projects and other specific activities, not support of Titular Members *per se*. The Bureau should endorse repeal or amendment of Bylaw 4.307, and Council should be asked to take this action in 1999, to be effective January 1, 2002.

2 In September 1998, the Bureau should endorse the phasing out of *all* existing Commissions by the end of 2001 and to recommend that Council take this action at the General Assembly in 1999. The Bureau should indicate that it will be receptive to very well justified proposals from Divisions to form a small number of new long-term Commissions, each with a termination date of no more than 10 years, to carry out activities that require such a long-term commitment.

3 The Divisions should be encouraged by the Bureau to accelerate the timetable in (1) and (2) to the extent feasible. Since all appointments to Commissions are now made for a two-year period, it may be desirable for a Division, cn a case by case basis, to reduce the size of particular Commissions and to divert the financial resources to support of specific projects. The Treasurer should be asked to cooperate with Divisions in redirecting financial resources, including funds reserved for the General Assembly, away from support of TMs *per se* toward support of individuals working on projects. Beginning in 2002, major changes in Division budgets will occur, as described in a later section.

Operation of a project-driven system

One of the principal concerns about the conversion of the Union's scientific activities from a Commission-based system to one based on individual projects is the lack of a very large permanent structure that can initiate and develop suitable projects. This is a valid concern, as pointed out in the SGR and confirmed by many comments from Commission members. The SDIC believes that the problems can be overcome as discussed below. There are three aspects that must be considered—(i) ideas for new projects, (ii) personnel interested in and capable of carrying out the project, (iii) development of the project in detail and management of the project.

Sources of ideas

Under the current system, ideas for projects are largely generated within an individual Commission. The ideas come from one or more individuals who are expert in a particular field and who have thought about the problems that give rise to a project. In some instances there may be a widely perceived need within the relevant scientific community for IUPAC action. At the other extreme, there may be a single individual who thinks that IUPAC could make a useful contribution to a particular problem or discipline. The SDIC believes that under the proposed structure these and other sources can be tapped for ideas.

Division Committees are to be given the principal responsibility for developing projects. To some extent, projects should emerge from discussions within the Committee, augmented initially by the chairmen and members of current Commissions as long as those Commissions exist. Division Committees should solicit views on potential projects from participants at relevant IUPAC symposia and other specialized meetings. This will require some planning and organization to arrange suitable feedback, perhaps by designating one or more Committee members to attend suitable meetings. The Secretariat may eventually be able to provide a professional staff member to assist, but the extent of the Secretariat's role needs to be worked out.

Ideas for projects should be actively solicited from NAOs, national chemical societies, regional federations, international specialty societies (primarily IUPAC Associated Organizations), and IUPAC Fellows. Simply sending out a call for projects is unlikely to be successful, as indicated by the general lack of response to simi-

lar invitations for Pool Projects over the last six years. A continuing effort from Division Committees is needed, with carefully planned follow-up action by the Secretariat. Moreover, vague ideas for potential projects are not sufficient. There must be adequate development of the concept, evaluation of its feasibility for IUPAC and realistic cost estimates. The Division Committees are ultimately responsible for most of this work, but considerable help from the Secretariat will be required.

IUPAC should continue to sponsor various levels of projects. Some may be of sufficient importance and urgency that significant resources should be committed, while others may be more along the lines of many current projects—often initiated by one or a few people, who are prepared to do all the work with little IUPAC support. In fact, in some instances the formal endorsement by IUPAC may be sufficient to attract other local sources of funds for individuals. However, each project should pass quality checks, as discussed below, and responsibility for conduct of each project should clearly be vested in an individual or a well defined Task Group.

Personnel to carry out projects

In some instances the current procedure by which the proponent of a project is usually charged with pursuing it may be sufficient and desirable. In other instances someone or some organization may make a compelling argument that IUPAC should undertake a project but with no suggestion as to who would be both capable and willing to carry out the volunteer work. The relevant Division Committee, with the active assistance of the Secretariat, must be able to identify suitable individuals with requisite expertise. Databases provided by journal editors and NAOs and developed from sources such as citation indices will undoubtedly prove to be valuable. Use of electronic communication tools, especially the Internet, should be beneficial.

Another aspect that deserves some guidelines is the geographic representation on a particular task group. For the current Commissions, the paramount requirement is expertise in the field, but considerable efforts are made to insure reasonable geographic balance. The SDIC believes that each Task Group should be treated on its own merits. For some projects it may be desirable to have the Task Group rather localized in order to prepare a document quickly and at minimum cost. In such cases, there should be a geographically broad review of the initial document and ultimate stamp of approval by a group viewed as representative (perhaps a Commission or the Division Committee). For other projects, it may be politically important at the beginning to have a Task Group balanced in several ways, including geography. In any event, there should be guidelines to insure that capable chemists from 'distant' places are included as appropriate.

Project development and management

The SDIC envisions that projects will be developed by the relevant Division Committee and that the Task Groups responsible for projects will report directly to that Committee. The elimination of the extra level of management currently supplied by a Commission is a key advantage of our proposal. However, the Division Committee must recognize the increased responsibilities and be prepared to accept them. The members of the Committee, individually and collectively, should be expected to provide active support to the Division President. The SDIC believes that the Secretariat must be able to offer substantial assistance to Division Committees and Officers in recruiting individuals to work on some projects, and the Secretariat must assist in the management of projects. The SDIC recognizes that these responsibilities will require an enhancement of the professional staff of the Secretariat but does not believe that the essentially volunteer character of IUPAC should change. Likewise, the traditional size and budget of the Secretariat need not increase if the staff at the new site is developed to provide professional assistance, in addition to administrative support.

Evaluation of projects

Current policies require that proposed projects be subject to 'outside evaluation' before approval by a Commission and by the Division President. In some instances rigorous critiques are obtained, analogous to those given by a referee of a journal article, while in other instances only a cursory analysis is undertaken. Past practice has often limited the description of a new project to a short paragraph, which is often inadequate for critical review by someone outside IUPAC. Since the 'priority' accorded a project has little or no relation to funding, there has been little incentive to improve either the project description or the rigor of evaluation.

The SDIC believes that a system for evaluating proposals prior to approval is essential. It must be seen within IUPAC as fair and must be viewed outside IUPAC as rigorous. Moreover, at some time after completion of a project there should be systematic evaluation of the accomplishments.

Prospective evaluation

A prospective evaluation has two purposes. First, it should weed out any proposal that IUPAC does not want to endorse—for example, something that is irrelevant to IUPAC's mission; that might be embarrassing to the Union; or that might be widely perceived as being undertaken solely to give credibility to an individual's 'pet project'. Although there may be few such projects proposed, it is important to the Union's reputation that

the review system impose some check point for such eventualities.

The second purpose of prospective evaluation is to allocate the Union's resources in an optimum way. In setting up procedures, IUPAC should be careful not to impose burdensome requirements. There should be considerable flexibility tied to the level of resources required. For example, an essentially one-person project (the product of which would ultimately be reviewed and approved broadly) might make few demands on IUPAC resources and require relatively little justification. A project that is funded within a Division's budget must be justified there but not at higher levels. A project that is proposed for central funding (the successor to 'pool projects') should have adequate justification for this purpose. A project that requires outside resources (UNESCO, ICSU, industry, etc.) may require more detailed justification. For all types of projects the totality of IUPAC resources should be considered, including Secretariat support and publication requirements, as well as direct costs for the project. It is likely that the principal direct costs will continue to be for travel and subsistence; however, even with the voluntary contribution of time by Task Group members there may be instances where modest expenditures for specific purposes, such as data evaluation or purchase of reagents, might be warranted.

The Bureau should develop general criteria to guide reviewers and establish detailed procedures for prospective evaluation at the Division level and centrally. The SDIC believes that the criteria should include the following:

- Inherent scientific quality of the project
- Anticipated impact on some aspect of the chemical sciences or interdisciplinary activities
- Relation to IUPAC's goals and strategic thrusts
- Provision for publication of results and widespread dissemination
- Cost/benefit ratio

Retrospective evaluation

Retrospective review and evaluation of individual projects has generally not been done at the IUPAC level, but some Commissions or Divisions do look at outcomes in a serious way. *The SDIC believes that the Bureau should set criteria for either a central evaluation or a mandated Division evaluation of the impact of a project and of the outcome relative to what was anticipated.* The nature and time frame for such an evaluation must be decided on a case by case basis, but must involve consultation widely with the relevant scientific community. Where applicable, quantitative assessments, such as literature citations or adoption of nomenclature by major journals, should be employed. Over a period of years, such retrospective evaluations can provide useful guidance on the selection of future projects. In addition, the retrospective review may be valuable in identifying material that can be used for public relations purposes and for future fund-raising.

Role of the Secretariat

Successful implementation of most of the recommendations by the SDIC will require more active assistance by the Secretariat in the management of Divisional activities than has been true in the past. The Secretariat must provide staff support to Task Groups, particularly those conducting projects with an urgent completion date. This support need not consume a large amount of time for any individual project but can be of critical importance in providing to a Task Group of volunteers the management discipline that can come only from full-time paid staff.

Collectively, for the projects within all Divisions' programs, this responsibility will consume significant staff time. Fortunately, this additional obligation is consistent with the Executive Director's desire to change the emphasis of the Secretariat's duties by utilizing computer and electronic communication technologies to minimize staff time and costs in carrying out administrative aspects of the work. The staff resources thus freed can be used for more professional activities, including assistance to the Divisions. In addition, the Secretariat should over time acquire information on potential sources of funds from industry and from international governmental and non-governmental organizations that might be available to help support certain IUPAC projects.

Financial considerations

The SDIC is well aware that financial support of the Union through subscriptions by NAOs is likely to expand, at most, by amounts to cover inflationary increases. Our recommendations are aimed at improving the setting of priorities and the management of activities to ensure cost-effective operations of the Union's programs. The Strategic Plan should be viewed as providing a rational approach to dealing with the many aspects of chemistry to which IUPAC can and does contribute, rather than a call to undertake large, new programs. The significant changes recommended in the organization and management of activities within the Divisions will be accomplished within the current budgetary framework.

The large savings that will result from removing support of regular meetings of Commissions will be redistributed, largely to support specific projects, with some funds used to solicit advice and plan projects and others perhaps needed for improved management. *The SDIC*

recommends that the Treasurer and Finance Committee analyze the budgetary implications of the SDIC's recommendations and propose to the Bureau a plan for redistributing projected savings in future General Assembly budgets beginning with the 2002–2003 biennium. Provision should be made to provide adequate funds to each Division, while retaining a central pool of funds that can be awarded competitively for interdivisional projects or for projects beyond the scope of an individual Division's resources.

Currently TMs are distributed from a central pool for approved 'pool projects,' with financial support related only to the number of TMs. Under the new policy, the central pool will consist of money, rather than TMs. If these funds are to be used effectively, there must be a mechanism for preparing and reviewing applications and for making decisions in a manner that fully utilizes the scientific expertise of the Division Officers but permits decisions to be made by an impartial body. *After consultation with Division Presidents, the IUPAC Officers should propose to the Bureau a mechanism for reviewing applications for project funding and allocation of resources.* Guidelines should also be developed for securing outside funding to prevent apparent conflicts of interest and to maintain the Union's independent character.

Summary of recommendations on organization and management of scientific activities

The SDIC recommends an integrated program, with a defined time frame, to convert from the present Division/Commission structure to one that is more dynamic and under which approved projects will be carried out by short-term Task Groups that report directly to the Division Committees. Principal features of this proposal are as follows:

A. Division Committee

1 The Division Committee is to become the focus of scientific work in the Division and has the overall responsibility itself for initiating, developing and managing the work of the Division. The Committee should solicit ideas for projects from NAOs, national chemical societies, regional federations, international specialty societies (primarily IUPAC Associated Organizations), IUPAC Fellows, and participants at relevant IUPAC symposia and other meetings.

2 Division Committees, with the active assistance of the Secretariat, must be able to identify suitable individuals with requisite expertise to carry out projects. Overall, but not necessarily for each project, individuals will be recruited world-wide.

3 The Bureau will develop a system for prospective and retrospective evaluation of projects, with general criteria to guide reviewers.

4 In order to strengthen the role and mandate of Division Committees, the Bureau will establish uniform nomination policies and procedures for the Members and Officers of all Division Committees, to govern the 1999 election process. These procedures will include the following points:
   (a) Each Division President will appoint a nominating committee of five members, consisting of no more than two Members of the Division Committee and three others chosen for breadth, with the overall membership approved by the Executive Committee.
   (b) Each Division will insure that the nomination of candidates for Division Officers is conducted in a thoughtful way, with adequate consultation within the Committee and with the President of IUPAC.
   (c) The Bureau will give Divisions authority to suspend the application of all Division Rules that are in conflict with the Bylaws or with the new policy enunciated by the Bureau. Within existing Statutes and Bylaws, the Bureau will provide maximum flexibility to Divisions in adjusting the size and composition of the Division Committee and Commissions.

5 The Bureau will establish a policy for appointment of National Representatives to Division Committees and for their participation in the work of the Divisions.

6 The Bureau and Executive Committee will give special attention to the application of the above recommendations within the current Sectional structure of the Division of Chemistry and Human Health.

B. Commissions

7 The Bureau will endorse the termination of *all* existing Commissions by the end of 2001 and recommend that Council take this action at the General Assembly in 1999. Any new Commissions formed must strictly adhere to the requirements of Bylaw 4.301 and have a definite termination date.

8 The Divisions will be encouraged to accelerate the timetable given above for reduction in Commission size and reallocation of financial resources to support of specific projects. The Treasurer and the Bureau will provide the maximum flexibility in allocation of money and Titular Members.

C. Secretariat

9 The Secretariat will provide professional staff assistance to Division Committees and Task Groups to facilitate the development, conduct and management of projects and the recruitment of individuals for Task Groups.

D. Funding

10 The Bureau will approve a policy of providing IUPAC funds for support of approved projects and other specific activities, not support of Titular Members *per se*. The Bureau will endorse suitable amendment of Bylaw 4.307.

11 The recommended changes are to be implemented within existing budget levels provided by NAO subscriptions (adjusted only for inflation). The large savings that will result from removing support of routine meetings of Commissions will be redistributed among scientific programs to fund specific projects and to finance necessary meetings of reconstituted Commissions and other planning and advisory groups.

12 Budgets will be adjusted to provide adequate funds to each Division and to retain a central pool of funds that can be awarded competitively for interdivisional projects or for projects beyond the scope of an individual Division's resources. The Bureau will establish mechanisms for reviewing applications for project funding and allocation of resources, both within Divisions and centrally.

Summary of formal actions required

Strategic Plan:
The Executive Committee has approved the Strategic Plan for 1998–99 and has authorized its use to guide program development during the current biennium. The Plan has been distributed widely within IUPAC and among the NAOs, and has been publicized outside the Union. Proposed actions for implementation of the Plan and for updating it biennially will be presented by the IUPAC Officers separately from this report.

Organization and management of scientific activities
If the EC accepts the recommendations of the SDIC in April, 1998, implementation will require a series of actions that may be summarized as follows:

April–September 1998: The EC should ensure that the report by the SDIC, together with its own views and proposals for implementation, is widely distributed within IUPAC and among the NAOs with a request for comments, identification of potential problems, and suggestions for improvements. During this period, written communications and informal dialogue among IUPAC Officers, Division Presidents and Commission Officers should be encouraged.

September 1998: The Bureau will be asked to approve a policy that (i) vests in Division Committees responsibility for selection of and management of scientific projects, (ii) defines the composition of Division Committees and procedures for selection of Division Committees and Division Officers, (iii) establishes criteria for approval of projects, and (iv) calls for a phasing out of all current Commissions.

October 1998: NAOs should be advised of the new policies and asked for comments and/or suggestions for modification of the policies. NAOs should be advised of changes in Bylaws that will be requested in 1999.

October 1998–August 1999: Division Officers and Division Committees, in consultation with their Commission Officers, should develop plans for making the transition to a project-based system no later than 2001, with some aspects phased in if desired in 1999. IUPAC Officers and the Secretariat should provide any required assistance and cooperate in modifying procedures whenever possible to facilitate the Divisions' efforts.

August 1999: Council will be asked to modify Bylaw 4.307 as described in the report. Council will be asked to terminate all existing Commissions, effective 31 December 2001.

Concluding statement

The SDIC recommends that the EC approve this program, request comments from IUPAC bodies and the Union's National Adhering Organizations, and submit the proposal (modified in detail if needed as a result of comments received) to the Bureau for action. The Bureau will be asked to endorse this program in September 1998 and set in motion the steps outlined above.

Appendix 1. Membership of the SDIC

	IUPAC Position
Prof. Joshua Jortner (Chairman) Tel Aviv University Israel	Vice-President, 1996–97 President, 1998–99
Dr Edwin D. Becker National Institutes of Health USA	Secretary General, 1996–99
Prof. Heindirk tom Dieck Gesellschaft Deutscher Chemiker Germany	
Prof. Mostafa El-Sayed Georgia Institute of Technology USA	
Prof. Robert Gilbert University of Sydney Australia	Macromolecular Division: Vice-President, 1996–97 President, 1998–99
Dr Alan Hayes ICI (Retired) UK	Chairman, CHEMRAWN Committee, 1996–97 Vice-President, 1998–99
Prof. Upendra K. Pandit University of Amsterdam Netherlands	Organic Chemistry Division: Vice-President, 1996–97 President, 1998–99

Prof. Pieter Steyn — Elected Member of Bureau, 1996–99
University of Potchefstroom
South Africa

Prof. Leiv K. Sydnes — Elected Member of Bureau, 1994–2001
University of Bergen
Norway

Prof. Andrea Vasella
ETH
Switzerland

Dr John W. Jost (staff support) — Executive Director
IUPAC Secretariat

Appendix 2. Initially suggested goals and mission statements

IUPAC goals [from Vice-President's Critical Assessment—Prof. Joshua Jortner]

These goals rest on the statutory objectives and should define the missions of IUPAC.

1 Serving as an international, nongovernmental, scientific, authoritative and objective advisory body for global issues related to pure and applied chemistry.
2 Contributing to the advancement, coordination and collaboration of world-wide academic and industrial research in chemistry.
3 Providing effective channels of communication in the international chemistry community.
4 Promoting the service of chemistry to society and to the international community.
5 Contributing to education in chemistry on all levels.
6 Encouraging young chemists in developed and developing countries.
7 Advancing the service of chemistry to developing countries.
8 Broadening the geographical base of the Union
9 Addressing globally important issues of chemistry.
10 Advancing the public understanding of science in the special context of chemistry.
11 Serving as the 'voice of chemistry'.
12 Enhancing the visibility of the activities of the Union for the sake of the discipline.
13 Maintaining the norms, values, standards and ethics of science.

Although not explicitly incorporated in the bylaws, issues 10–13 are central for the international chemistry community and for the impact of science on society.

The Goals of IUPAC, an Ethically Based International Scientific Union [excerpted from paper by Prof. Pieter Steyn]

Inwardly directed Goals (traditional goals)

1 Serving as the leading (or representative) international, authoritative and objective advisory body for globally important issues related to the practice of pure and applied chemistry.
2 Contributing to the advancement, co-ordination and collaboration of world-wide academic and industrial research in chemistry.
3 Facilitating effective channels of communication in the international chemistry and scientific community.

Outwardly directed Goals (Service to the Society at Large)

1 Promoting universal access to the benefits of chemistry through formal, non-formal and informal education.
2 Contributing to the advancement of education in all aspects of chemistry in terms of quality and appropriateness.
3 Promoting chemical industry in its contribution to sustainable development, wealth creation, and the improvement of the quality of life. [Wealth creation may be omitted].

IUPAC Mission and strategic thrusts [excerpted from paper by Prof. Upendra Pandit]

IUPAC Mission: To advance and contribute to all international aspects of chemistry and to serve the interests of the international chemical community in the 21st century

Strategic thrusts:

IUPAC in the service of man

1.1 Respond to the evolving developments in Chemistry, especially with reference to interdisciplinary areas
1.2 Foster the positive image of chemistry as the 'MOLECULAR BASIS OF HUMAN WELFARE IN THE 21st CENTURY'
1.3 Initiate activities in areas of global concern where Chemistry can help to provide visible solutions on a short to medium time-scale basis [environment, ecology, bio-diversity, international aspects of health care, etc.]
1.4 Develop Programs directed to the specific needs of technically less-developed countries

IUPAC in the service of chemists

2.1 Establishment of international chemical standards, terms, codification and nomenclature—where it can be done effectively by the IUPAC
2.2 Development of Forums and Channels for Exchange of information on 'Educational Methods'
2.3 Coordination of Technical Training (setting-up an

International data-bank on available training positions and applicants, e.g. on postdocs)

2.4 Facilitate International Industrial Partnerships (databank on 'effective' academic, industrial and other laboratories which can do contract-work on specific projects)

2.5 Establish an IUPAC Information Centre to which chemists, affiliates and non-affiliates alike, can address their enquiries

2.6 Establish 'Name' Awards, Lectures and Fellowships for young chemists

The contribution of IUPAC in these areas is warranted on the basis of its Global Position, International Recognition and Available Expertise.

Appendix 3. Organization and management of IUPAC's scientific work

During the last few years there has been intensive study, discussion and debate within the Union on what was first termed 'restructuring' but later broadened to the more general 'Scientific Policy of the Union.' A number of proposals have been advanced, some have been adopted, some have been rejected outright and others have been declined for the present but might be introduced at a future date. Concurrently, during the last year, there have been increased efforts to address the overall mission and strategy of the Union, partially with advice from leading chemists outside IUPAC. These broader ideas have been focused in Vice-President Jortner's Critical Assessment (VPCA), which presents recommendations for establishing overall Goals and for expanding the scope and emphasis of IUPAC's scientific work. The present document complements the VPCA in addressing questions of organization and management of the scientific work.

Within the last two years, three of our seven Divisions have been or are being restructured to create Divisions of (i) Chemistry and the Environment, (ii) Chemistry and Human Health and (iii) Macromolecular Chemistry and Materials [name subject to modification]. Although further restructuring at the Division level is certainly possible, it has been decided as a result of discussions within the last year that the remaining four Divisions will in the near future retain their traditional scope of Physical, Inorganic, Organic and Analytical Chemistry. However, at the level of the Division Presidents and the Executive Committee, there is a strong consensus that additional flexibility is needed to tackle projects within a specific and limited time frame and to address problems that cross traditional boundaries within chemistry and between chemistry and other disciplines.

Some historical perspective

Most of the scientific work of the Union emanates from Commissions, augmented in many instances by Division Subcommittees, Working Parties and Task Forces. Over the years IUPAC has established a network of Commissions (currently numbering 37). Occasionally a new Commission is formed, sometimes there is a change in the name and/or terms of reference of a Commission and (quite infrequently) a Commission is abolished. Overall, there has evolved an organization that has the virtue of stability but the shortcomings of a static structure. Yet, the Statutes and Bylaws anticipate a more dynamic composition of Commissions. Statute 10.4 states: 'Each Division and Section may include such Commissions as are approved by the Council', while Bylaw 4.301 prescribes a detailed procedure for analyzing the need for a new Commission, including a report to Council. B 4.301 concludes: 'This report, if favourable to the creation of a new body [Commission], shall contain an indication *as to the probable duration of the life of the new body* and an estimate of its annual cost.' [Emphasis added] Bylaw 4.302 states: 'At each General Assembly, the Council shall in the light of the Division or Section President's report and on the recommendation of the Bureau decide *whether or not to continue each Commission*.' [Emphasis added]

In spite of the flexibility built into the Statutes and Bylaws, the structure has been largely static. As long ago as 1955, President Tiselius observed that '...many of our Commissions do very fine work and have justified their existence beyond any doubt...Perhaps it would be practical to introduce a distinction between standing Commissions and Commissions set up for a definite, limited task. The second type should be limited in their mandate to, for example, two years (that is to say, between two Conferences of the Union), and should be given opportunities to meet within this period. Their task would, of course, be entirely different from that of a standing Commission which involves maintaining a more or less continuous survey of a given field and taking action whenever necessary.' Yet, such limited lifetime Commissions have been formed only once—as an interim measure to postpone or avoid the creation of more permanent Commissions—and few Commissions have been abolished. In 1973, President Bénard pointed out why this is the case: 'It is easy to obtain general approval for the creation of new bodies, but it is difficult to decide to abandon existing ones. The reason for this is that it takes far more courage to say 'no' than to say 'yes', particularly when the consequences involve our friends.' He went on to say: 'An institution which does not have the strength to renew itself is an institution condemned at length to sterility.'

The current concerns on restructuring stem from 1981, when President Zollinger made the first real 'critical assessment' of IUPAC projects. According to his analysis, the problems seemed to stem from '(1) inefficiency and too long duration of a relatively large number of projects; (2) insufficient use of our traditional means to solve problems in a changing world; (3) the involvement of too small a circle of chemists in IUPAC work—a reporter in Davos even called this circle a 'charmed circle'.' Sixteen years after Zollinger's appraisal, and after a series of initiatives to correct these perceived deficiencies, we have many more projects than Zollinger had to contend with, the traditional means are not working well, and we still have a 'charmed circle.'

Let's be clear: Even with these shortcomings, IUPAC Commissions have done and continue to do outstanding work for the international chemical community. Our challenge is to insure that such high quality work continues but that the projects undertaken are widely regarded as relevant to today's world and are completed in a time frame consistent with the fast pace of modern research and industrial development. We must reach out to a broad international community of chemists to help define the needs on which IUPAC projects are based and to recruit the most talented chemists worldwide to work on these projects. As evidenced by the quotes from 1955, 1973 and 1981, it has not been possible to achieve the dynamism needed within our present structure and mode of operation. *We need to convert from a primarily static Commission structure to one that is largely based on time-limited Commissions formed to carry out specific, well defined tasks.*

Philosophical basis for a new organization

Under this concept, the IUPAC organization would continue to consist of Council, Bureau, Standing Committees and Divisions (including Division Committees). However, the norm would be that Commissions should not be regarded as part of the 'regular' organization but rather as the temporary working groups that carry out specific projects developed by the Division Committees with the help of the Governance and the Secretariat. There may be areas in which continuity is needed, such as organization of a regular series of symposia. Such activities might now be carried out by a Commission, but a continuing Subcommittee of the Division Committee could take over such functions.

Divisions should regard the entire world-wide chemical community as the resource for both ideas and for volunteers to carry out projects, not the 'charmed circle' of IUPAC insiders. Likewise, ideas for projects should come from the world-wide community. Just how to generate such ideas, develop projects and seek out people able and willing to work on the projects is, of course, the key to success or failure. I am convinced that ideas for useful work usually originate in a 'bottoms-up' manner, not as directed from 'top-down'. In fact, the establishment of the pool TMs was to permit the undertaking of such 'top-down' projects generated outside the mainstream of Commission activity, but after several years there are very few such projects. If we implement the type of structure envisioned here, but without a good mechanism to identify and develop projects—and to secure the services of experts on the Commissions—we will kill the useful work that is now being done. A great deal of thought and planning is needed to insure that IUPAC can develop the processes to do this without the large cadre of long-term members of Commissions. I do not pretend to have the answers, but I think that the following steps would be desirable:

- Insure through the nomination process that the members of the Division Committees are people with a broad outlook in their discipline. This will help in generating ideas and in finding good people to work on Commissions.
- Include on Division Committees (wherever possible) editors of major journals, who have databases of potential project referees and Commission members. Also, editors may be more aware than the average chemist of areas in which IUPAC work on standardization, terminology, etc. is really needed.
- Establish close relations between the professional staff of the Secretariat and national chemical societies and NAOs to identify potential workers.
- Use IUPAC-sponsored symposia more effectively to advertise IUPAC activities and to solicit ideas for projects through brainstorming sessions at such symposia. The Secretariat should play a stronger role than it now does in the arrangements for symposia, and a staff member could attend to note what ideas are generated.
- Ask Division Committees to organize planning meetings of carefully chosen people to evaluate the need for a Commission in a given field or to define a project and suggest Commission members.
- Insure that a real refereeing system is in place for projects proposed by members of Division Committees or members of any existing Commission.

Under this concept, each Commission would have a defined task with a defined product and a defined time in which to carry out the project, along with a budget, expressed in dollars, not Titular Members. It would be expected that the members of a Commission which has completed its task will consider their current active involvement in IUPAC to be over until they are asked to serve on a new Commission. Clearly, some people who distinguish themselves on such projects may also be

asked to serve on Division Committees or in some other capacity, but there should be no general expectation of a long-term active involvement. However, creation of an IUPAC Fellows Program [as will be proposed to Council in Geneva] would, over the course of time, insure that anyone who has ever worked on any IUPAC activity or project would have the opportunity to remain in touch with current activities and to make suggestions for new projects and Commission members.

Proposed course of action

The first step, completed at the Executive Committee in Jerusalem, was to discuss the ideas articulated here and to integrate those with proposals from individual Divisions and with aspects of the VPCA. The EC endorsed the *concept* of an organization based primarily on time-limited Commissions but recognized that implementation will be dependent on solving a number of problems, some of which are given above.

The EC also endorsed in principle the recommendations in the VPCA to establish clear Goals for IUPAC but, again, recognized that further thought and discussion are needed to refine the Goals. The EC concluded that a broad-based committee would be needed to develop the necessary strategic thrusts and to consider their implementation in terms of the structure and guidelines for scientific activity. The EC therefore authorized the formation of a Strategy Development and Implementation Committee (SDIC), to report back to the EC in April 1998. From the findings and recommendations of the SDIC, the EC expects to formulate specific proposals for approval by the Bureau in September 1998 and for necessary action by Council in 1999.

The examination of these issues by the SDIC and the possible implementation of broad changes in goals, structure and operation of IUPAC and its constituent parts should not negate actions currently underway in and between several Divisions to effect a number of specific structural and functional changes during 1997.

Edwin D. Becker,
Secretary General

Appendix 4. Selected bylaws

B4.1 Division and Section Committees

B4.101 Each Division or Section shall be administered by a Division or Section Committee which shall be the organ of liaison between the Bureau on the one hand and the various bodies constituting the Division or Section on the other hand.

B4.102 The Titular Members and Associate Members of a Division or Section Committee and of Commissions within a Division or Section shall together form the Membership of the Division or Section.

B4.103 The Titular Members of each Division or Section Committee shall be elected by the Membership of the Division or Section according to its rules and shall not exceed 10 Titular Members, unless otherwise determined by the Bureau. The term of service of a Titular Member shall be not more than four consecutive years, but shall cease on election as an officer. The Vice-President and the President of a Division or Section shall not hold these respective offices for more than four consecutive years; the Secretary of a Division or Section shall serve for four consecutive years and be eligible for reelection up to a maximum of a further four years. Exceptional circumstances must be established and special permission of the Bureau granted for Titular Membership of the same or more than one Division or Section Committee beyond a total of 12 years whether the Titular Memberships are consecutive or not.

Subject to this provision the immediate Past-President of the Division or Section shall be one of the Titular Members of the Division or Section Committee for a period of two years. In addition to these Titular Members the President, Vice-President, Secretary General, and Treasurer of the Union shall be ex officio Members of all Division and Section Committees.

Additionally a Division or Section Committee may elect Associate members, who shall have full voting rights. The number of Associate members shall not exceed six. The term of service of an Associate Member shall be two years, with the possibility of reelection consecutively for two more years only.

A newly elected Titular Member or Associate Member of a Division or Section Committee shall assume office only after approval by the Bureau or Executive Committee. The Adhering organization with which the Titular Member or Associate member is connected shall be notified of the appointment.

B4.104 The Division or Section Committee shall elect from among its existing and, subject to confirmation, new Titular Members a President, a Vice-President designated as President-Elect, and a Secretary. These elections shall be subject to approval by the Council.

B4.105 The Division or Section Committee may form a Division or Section Executive Committee, consisting of the President, the Vice-President designated as President-Elect, and the Secretary of the Division or Section, to carry out the necessary administrative

duties between meetings of the Division or Section Committee.

B4.106 The functions of the Division or Section Committee shall be:

B4.1061 to propose to the Council through the Bureau the establishment of Commissions to be attached to it and to appoint the membership and the initial officers of these, the appointments having to be approved by the Council;

B4.1062 to propose to the Council through the Bureau the dissolution of existing Commissions when required;

B4.1063 to supervise the work of its Commissions and other bodies;

B4.1064 to plan and organize scientific meetings and other activities which are deemed useful in furthering the objects of the Division or Section;

B4.1065 to prepare a budget for the Division or Section in accordance with a procedure to be prescribed by the Treasurer, for consideration and approval by the Bureau and the Council;

B4.1066 to advise the Bureau for recommendation to the Council on scientific matters.

B4.107 The Division or Section Committee shall meet at least every two years, during a General Assembly.

B4.108 Decisions of the Division or Section Committee must receive the approval of the Bureau when they would have financial consequences involving the budget of the Union. In addition, in order to ensure the fullest coordination between the activities of all the Divisions and Sections the Secretary General at the Secretariat shall be informed of all other decisions taken by the Division and Section Committee.

B4.109 At a General Assembly the Division or Section President shall report to the Council on the activities of the Division or Section since the last General Assembly. In a year in which a General Assembly is not held the Division or Section President shall present to the Division or Section Committee and to the Bureau a written report on the activities of the Division or Section since the last General Assembly.

B4.110 Each Division and Section shall make provision for the conduct of the work of its Commissions and other bodies. Such provision, which must receive the approval of the Bureau, may be incorporated in Divisional or Sectional rules.

B4.3 Commissions

B4.301 On the recommendation of a Division or Section Committee, through the Bureau, the Council may create a Commission of the Division or Section. Each Commission shall have as its object the study of topics of international scientific or technical significance requiring agreement, regulation, standardization, or codification in some aspect of pure or applied chemistry. The terms of reference of a new Commission shall be clearly described and approved by the Council. If a Division or Section Committee wishes to create a Commission, it must apply to the Bureau for the appointment of an ad hoc committee of three persons which shall study the question and then report back to the Bureau. This report, if favourable to the creation of a new body, shall contain an indication as to the probable duration of the life of the new body and an estimate of its annual cost.

B4.302 At each General Assembly, the Council shall in the light of the Division or Section President's report and on the recommendation of the Bureau decide whether or not to continue each Commission.

B4.305 (in part) Besides the Membership of a Commission the following may attend Commission meetings:

(i) National Representatives nominated by the various Adhering organizations and approved by the Commission. A Commission may coopt not more than one such representative from an Adhering organization, but such representation shall not be permitted if the Commission already has a Titular or Associate Member from that Organization, unless exceptional circumstances are established and special permission granted by the Bureau. Such representation shall lapse at the conclusion of the next General Assembly unless the person is renominated by his Adhering organization and reapproved by the Commission. Reappointment of National Representatives beyond a total of 12 years service, whether these are consecutive or not, requires that special circumstances should be established by the Adhering organization.

B4.307 Titular Members of Commissions have the right to receive contributions towards travel and subsistence expenses from funds of the Union as authorized by the Treasurer acting on behalf of the Union. Contributions may be made to Associate Members or members of subcommittees on recommendation of the Division or Section President and with the agreement of the Treasurer.

Committee on Project Evaluation Criteria

The Executive Committee (EC) has endorsed the integrated program and time frame proposed by the Strategy Development and Implementation Committee (SDIC) for improvement in the organization and management of the Union's scientific activities. As proposed by the SDIC, several aspects of this program must be developed in more detail in order that the EC can present for Bureau approval in September 1998 a comprehensive plan for implementing the program.

The EC has appointed an *ad hoc* Committee on Project Evaluation Criteria (CPEC) to advise the EC and the Bureau on criteria for the evaluation of project proposals; on mechanisms for approval of such proposals and allocation of resources; and on criteria for retrospective assessment of the outcomes of projects.

The CPEC membership is comprised of Elected Members of the Bureau and Division Officers, whose collective experience will insure that the perspectives and needs of the Divisions are addressed along with the requirements of a project-based system. Membership of the CPEC follows:

Prof. Gus Somsen (chairman) Elected Member of Bureau.

Prof. John Corish President, Inorganic Chemistry Division.

Prof. Folke Ingman President, Analytical Chemistry Division.

Prof. Werner Klein Vice-President, Div. of Chemistry and the Environment.

Dr Edwin Przybylowicz Elected Member of Bureau.

Prof. Pieter Steyn Elected Member of Bureau.

Dr John W. Jost (staff support) Executive Director, IUPAC.

The CPEC is charged as follows:

1 Recommend procedures and assessment criteria, as outlined in the SDIC report, for evaluation of project proposals by IUPAC and non-IUPAC reviewers
   - at the Division level
   - centrally within IUPAC
   - for external funding.
2 Recommend a mechanism for reviewing applications for central funding of projects and allocation of resources, within the guidelines proposed in the SDIC report.
3 Recommend criteria and procedures for retrospective evaluation of projects to assess their success and impact, along lines proposed in the report by the SDIC.
4 Provide a report to the EC encompassing the above recommendations by 15 August 1998.

History of chemistry in the Czech Republic

Chemistry International **inaugerates in this issue a new series of articles describing the history and status of Chemistry in the member countries of the Union.**

Our first article describes the History and Current Status of Chemistry in the Czech Republic

What is now the Czech Republic is in an area that was occupied by the West-Slav Czech tribes (Samo Empire, AD 623–658). The Premyslides dynasty originated among these tribes. The beginnings of the Czech state extend back to the period of the reign of the first Czech Prince Bořivoj at the castle site Budeč in the Prague Basin (by 891). The nucleus of the Czech state was fixed during the reign of Prince Wenceslas (924–935). The Premyslides of the House of Slavnik were able to centralize the whole territory of Bohemia in the 10th century. Beginning in the first half of the 11th century, further regions were annexed, and during the 13th century, the basis of the feudal political formation was created as the Counties of the Czech Crown.

The Czech King and Holy Roman Emperor Charles IV of the House Luxembourg (1316–1372), made the royal seat Praha the largest town of Central Europe and founded the oldest university in Central Europe. Many outstanding scholars were affiliated with the Charles University. The great progress of natural philosophy in the Czech Kingdom occurred during the second half of the 16th century when Rudolph II (1552–1612), who was both Czech King and Holy Roman Emperor (1576–1611), supported alchemy, astrology and arts, as well as inviting many learned men to work at court, e.g. the astronomers Tycho de Brahe and Johannes Kepler (from 1600 to 1611). One of the great men in the history of Czech civilization was Jan Amos Komensky (1592–

Medieval College, the Carolinum.

1670), who created the fundamentals of modern pedagogy and who occupies a prominent position in the world history of teaching for his work in methods of cognition and knowledge.

A change-over from hand manufacture to machine production was in progress in Bohemia during the 18th century when the pre-scientific stage of chemistry (iatrochemistry, pflogiston theory) was transformed step by step into science. In 1707, the Professional School of Engineering was opened in Praha; this School became, in 1803, the Polytechnic Institute from which the Czech Technical School in Praha arose in 1863 (the Czech Technical University at Praha from 1920 onwards). Another school, the Private School of the Arts, Humanities and Social Sciences was active in the period 1770–1775 and, in 1784, changed its title to the Czech Society of Science. This Society was then, in 1790, re-named the Royal Czech Learned Society which, as the only Czech learned society, published the results of Czech scientific research into the 19th century. In 1871, the Czech Chemical Society was established, the Society for Chemical Industry followed in 1892; lastly, the two Societies merged into the Czech Society for Science and Industry (1906). The Czech Academy of Science and Art was founded in 1890 (originally the Czech Academy of Emperor Francis Joseph). In 1895, the Czech Technical Foundation, an association of Czech engineers, was established in Praha with the aim of issuing technical literature in the Czech language and supporting its formation. (For the development of industry in the 18th and 19th centuries, see below.)

The Czech contributions to the development of chemistry were, from the first half of 19th century to the first half of the 20th century, made predominantly in universities. There, research was carried out in departments chaired by outstanding Czech professors of chemistry. Some notable examples are: Bohuslav Brauner (1855–1935), a disciple of R.W. Bunsen and H.E. Roscoe and Mendeleev's friend. Brauner was a pioneer of the periodic system of elements. He determined the atomic weights of 26 elements, including the lanthanides La, Ce, Pr, Nd and Sm and the actinides Th and U. He also proposed oxygen as the basis of relative atomic weights (1888). Emil Votocek (1872–1950), founding father of the Czech scientific school of organic chemistry, was the author of many original studies in the field of the chemistry of saccharides. Votocek´s successor was Rudolf Lukeš (1897–1960) who was in scientific contact with L. Ruzicka (1887–1976, Nobel Prize in 1939, honorary doctor's degree from Charles University in 1948) and V. Prelog (1906–1998, a graduate of the Czech Technical University at Praha, Nobel Prize in 1975), professors at the technical college in Zurich. Jaroslav Heyrovský (1890–1967) discovered the use of a dropping mercury electrode for electrolysis (1922). He was awarded the Nobel Prize for discovering the polarographic method and its use in analytical chemistry (1959). František Šorm (1913–1980), headed a research group that became famous for the synthesis of natural compounds, mainly terpenes and biologically active components of plants. Otto Wichterle (*1913), the author of excellent textbooks of inorganic and organic chemistry and inventor of the soft contact lens; his research group discovered rapid casting polymerization of lactams.

There were 22 schools of the university type in Czechoslovakia in 1949, 36 schools in 1982, and 41 schools in 1987. In the Czech Republic, there were 18

The Institute of Macromolecular Chemistry.

those schools in 1991 out of which six schools either were specialized in the education of chemistry or included faculties for teaching in chemistry—Charles University (Praha), Masaryk University (Brno), Palacky University (Olomouc), Institute of Chemical Technology at Prague, University Pardubice (Pardubice), and Technical University Brno (Brno).

In 1952, the Czechoslovak Academy of Sciences was established (the Academy of Sciences of the Czech Republic at present), and the centre of fundamental research in all branches of science was shifted to its scientific institutes (totalling 64), among them are the Institute of Inorganic Chemistry (Praha), Jaroslav Heyrovsky Institute of Physical Chemistry (Praha), Institute of Organic Chemistry and Bio-chemistry (Praha), Institute of Macromolecular Chemistry (Praha), Institute of Analytical Chemistry (Brno), and Institute of Chemical Process Fundamentals (Praha). All the laboratories of the Academy were equipped with the most modern instruments, and their research results, published in scientific periodicals or delivered as lectures at international meetings, have been recognized worldwide, e.g. the studies of R. Zahradník in the field of quantum chemistry, and the papers of A. Holy on the syntheses of nucleic acids and on the chemistry of antimetabolites.

An early symptom of the industrial revolution in Bohemia was the Industrial Exposition arranged in Praha in 1791 as the first of that type in Europe. The first chemical plant had been put into operation in Lukavec as early as 1630. During the following two hundred years, it produced sulfur bloom and rolls, Czech sulfuric acid (vitriol, oleum), vitriol of copper, vitriol of iron, ochre of iron, muriatic acid, nitric acid, and English sulfuric˘acid (chamber acid). From 1800, there were Starck Works in Bohemia (Kraslice, Hromnice, Vranov, Kaznčjov), which produced, in addition to the chemicals produced by Lukăvec, alum, Glauber's salt, and citric acid. In 1801, the first sugar-beet factory was opened in Bohemia (Horovice). The first establishment for chemical production in Praha (muriatic acid, nitric acid, Glauber salt) dates from 1815. The production of soda by the Leblanc process existed in Hrušov (1851). In 1856–57, two significant chemical concerns were founded in Bohemia—the Chemical Factory Carl Rademacher & Co. (Praha—Karlín) and, the Syndicate for Chemical and Metallurgical Production (Ústí nad Labem). During the latter part of the 19th century and the first part of the 20th century, măňy chemical works arose, e.g. of dynamite (Roztoky u Prahy, 1868), ammonia and ammonium salts (Praha—Zizkov, 1869), fertilizers and chemicals (Kolín, 1871), lacquers and tin salt (Praha, 1894), zinc paints (Retenice, 1895), carbide (Libkovice, 1899), and paints (Letovice, 1910).

After the First World War, industry formed the main

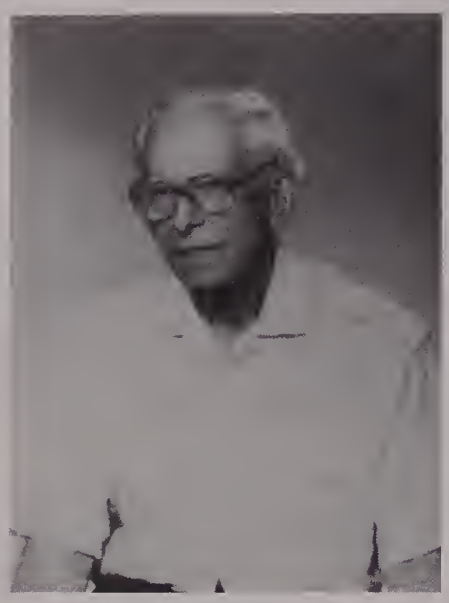
Prague Congress Centre.

part of the national product in Czechoslovakia; its industrial production was the seventh highest in the world. After a stagnation during the Second World War, through 1982, production advanced roughly 13-fold on average. Some examples of production increases in specific products (in thousands tons) are, from 1937 through 1982: plastics 1/957, synthetic fibres 4/180, paper 246/928, refined sugar 667/894, and cement 1273/10 325.

In the Czech Republic (area ≈ 79 000 km^2, population ≈ 10 000 000), 41% of the population was active in industry. This was 66.7% of the national income in 1983. In 1991, there were 223 industrial wŏrks, among them 31 works for the production of chemical and rubber materials (e.g. Barum—Otrokovice, Kaucuk—Kralupy nad Vlt., Chemical Works—Sokolov, Chemopetrol—Litvínov, Fatra—Napajedla, Gumotex—Breclav, Lachema—Brno, Moravian˘Chemical Works—Ostrava, North-Czech Chemical Works—Lovosice, Optĭmit—Odry, Silon—Planá nad Luz, Spolana Neratovice, Synthesia—Semtín, Technoplast—Chropync). In addition, the Ministry of Health coordinated 10 production establishments (e.g. Galena—Komárov u Opavy, Research Institute of Antibiotics and Biotransformations—Roztoky u Prahy, and Research Institute of Pharmacy and Biochemistry—Praha). The economic results of chemistry was affected also by the activity of the institutes of applied research (16, e.g. Research Institute of Inorganic Chemistry—Ústí nad Labem, Research Institute of Organic Syntheses—Rybitví, and Institute for Research, Production and Application of Radio-isotopes—Praha) and design institutions (23, e.g., Chemoprojekt—Praha). All those works and establishments turned into joint-stock companies after the split of the Czech and Slovak Federal Republic and the formation of the Czech Republic at the beginning of 1993. The chemical turnover for the Czech Republic in 1993 was 2.47×10^9 USD (according to CEFIC figures).

Czechoslovakia has been a member of the International Union of Pure and Applied Chemistry (IUPAC)

since 1920, shortly after its foundation. The representatives of Czechoslovakia have always been significant participants in Union activity. Some of the well known Czech personalities were members of Bureau of IUPAC: E Votocek (Vice-President of IUPAC, 1922–1925), O. Tomicek (1947–1951), O. Wichterle (1961–1971, Member of the Executive Committee 1965–1969, one of founders and the first President of the Macromolecular Division, 1967–1971), V. Herout (1969–1977), and A. Vlcek (1979–1987, Member of the Executive Committee 1985–1987). Out of many other active Czech members of IUPAC we should also mention B. Brauner, who was a founder-member and later the Chairman of the IUPAC Commission on Chemical Elements (1921), and P. Kratochvíl who was the Chairman of the Commission on Macromolecular Nomenclature for six years (1985–1991). At the present time, the Czech Republic is represented by the Czech National Committee for Chemistry as well as by 10 elected members and 15 nominated national representatives on IUPAC Standing Committees and Division bodies. There are a number of institutions in the Czech Republic (e.g. the Czech Commission on Nomeclature of Organic Chemistry, the Czech Commission on Macromolecular Nomenclature, and J.M. Marci Spectroscopic Society) that translate IUPAC documents and publish them in the national chemical journal Chemické Listy, as well as the National Centre of IUPAC for the Czech Republic that distributes IUPAC documents on nomenclature and terminology (in English and Czech). The IUPAC General Assembly and the IUPAC Congress were held in Prague in 1967; since that year, 55 meetings in the series of Prague Meetings on Macromolecules (Microsymposia and Discussion Conferences on Macromolecules, under the auspices of IUPAC) have been organized in Prague. The IUPAC International Symposia on Macromolecules were held in Prague in 1957, 1965 and 1992.



O. Wichterle

P. Cefelín,
Associate Member of the Macromolecular Division Committee of IUPAC and Secretary of the Czech National Committee for Chemistry

Recent reports

Characterisation of finite length composites: Part IV—structural studies on injection moulded composites (Technical Report)

Synopsis: The microstructure of discontinuous fiber composites can be articulated by many parameters. In this collaborative study as part of series of parallel projects under the IUPAC Working Party IV.2.1 on Structure and Properties of Commercial Polymers, various laboratories have carried out measurements. Their results and observations are summarised in this paper. In this family of materials, the microstructure should be described by at least three parameters, namely fiber orientation distribution, fiber length distribution and fiber content.

It is shown in this work that there is a profound influence of the processing history on the microstructure for these composite materials, and that there is a considerable challenge in measuring the macro-, meso and microstructural aspects.

Introduction

The materials under investigation in this study are injection moulding engineering plastics which have been prepared by pultrusion compounding. It is now well established that this family of materials can produce significantly longer fibers in the moulded artefact than by traditional extrusion compounded means. This margin may reach as much as an order of magnitude higher aspect ratio, but depends upon the fiber/matrix system and the manner in which subsequent processing takes place. An optimum number average l/D ratio for extru-

sion compounded (short) fiber composites would be 100 to 200, but in the case of pultrusion compounded (long) fiber compounds) can reach values in excess of 1000; this very much depends on the processing geometry, flow path and mould cavity design, and actual magnitudes of attainable fibers lengths are always relative to the severity of processing. In some cases, individual residual fibers of the original length (l_0) have been observed in long fiber moulded parts. The conventional injection moulding process is used with effectively similar conditions for both feedstock variants; this forming process offering a limited range of processing variables for altering the microstructure-properties relationship.

Producing components composed of longer fiber reinforced composites provides interesting new challenges for characterisation, and changes in fiber length and orientation are more pronounced. The influence of the flow path and shear history has a profound effect upon the resultant microstructure and hence the ultimate properties. The rheological characterisation of these materials with an insight into the flow induced morphological changes is described elsewhere.

In moulded panel components, the extent of in-plane anisotropy arising from the injection moulding process can be moderated by the methods reported by Allan and Bevis, In their novel process development, once the melt is injected into the mould in the normal way, it is pulsed in order to align polymer chains and fibers by shearing the fluid material remaining in the mould cavity by actuating pistons, typically these operate in the direction of mould-fill. Their process is known as the multiple live-feed process.

The microstructure of injection mouldings is extremely complex. It is challenging to attempt to characterise the fiber and molecular orientation of both conventional and multiple live-feed injection moulded samples. It is often convenient to visualise the microstructures attained by the simple model of through thickness skin/core/skin layers, and for this study it was our intention to produce some variations by influencing the flow and hence the processing conditions which dictate the resultant 'structure'. If a wide range of moulding conditions are used, and the resultant moulded parts are truly 'structures' then there is an implication that each structure requires experimental characterisation of its morphology before any description of the overall mechanical properties and the material properties is possible.

In order to gain this understanding, a move towards a quantitative microstructural characterisation is necessary. This paper is part of a series from the work carried out by IUPAC Working Party IV.2.1 and focuses on the microstructural issues observed by the contributors. In principle, this involves a measurement of fiber length distribution, fiber content and the fiber orientation function.

In exploring the relationship property-structure-processing and rheology we intend to conduct the work with both traditional and multiple live-feed mouldings. Moreover, the materials will have two different fiber systems (glass and carbon, Kevlar® is omitted) and two different matrix materials (polyamide 6,6 and polypropylene). This paper forms part of a series concerned with these materials which describes the mechanical properties, processing routes and flow characteristics of this family of materials. Moreover, the microstructural data in this study is used to model the stiffness in Paper V which follows on in this series of papers.

The following laboratories have contributed to this project under the umbrella of an 'AC working party (Working Party IV.2.1) and this hopefully adds value to the contribution of this work:

Laboratory 1 ICI Materials (D.R. Moore, R.S. Bailey, G. v Bradsky, R.S. Prediger). Laboratory 2 Shell Research Arnhern, (A. Cervenka).
Laboratory 3 Rhone-Poulene, (Y. Giraud).
Laboratory 4 Huls AG, (H. Motz).
Laboratory 5 National Research Council Canada, (T. Vu-Khanli).
Laboratory 6 Brunel University, (M.J. Bevis, P.S. Allan).
Laboratory 7 BP Chemicals, (M.J. Cawood, A. Gray, with contributions from the A. Duckett at the IRC, Leeds University).
Laboratory 8 Institut für Technische und Makromoleclare Chemie, Hamburg (H.G. Zachmann, G. v Krosiąk).

This report was prepared for publication by: G.J. von Bradsky, R.S. Bailey[1], A.J. Cervenka, H.G. Zachmann and P.S. Allan ([1]ICI Technology, PO Box 90, Wilton, Middlesbrough, Cleveland TS90 8JE, UK), for the Working Party on Structure and Properties of Commercial Polymers, of the Commission on Polymer Characterisation and Properties, Macromolecular Division. The full details are to be found in Pure Appl. Chem. *1997, **69**, 2523–2539.*

Characterisation of finite length composites: Part VI—Rheological studies of materials based on the polypropylene matrix (Technical Report)

Synopsis: A range of rheological and morphological techniques, contributed by nine laboratories, are used to characterise the flow behaviour in a model long fiber reinforced thermoplastic system. It is concluded that in capillary rheometry, the pressure drop fluctuations that typify the flow arise from two mechanisms, that of local fiber fraction inhomogeneity passing through the die, and the instability of the vortices in the die entry region

which w6rsen as shear rate is increased. It is clear that the test geometry is significant in both capillary and torsional measurements. Yield stresses of 3.5 Pa (5 mm fiber length) and 7 Pa (10 mm fibres) have been evaluated.

Introduction

The materials under study are commercially available as pultrusion compounded injection moulding compounds and are known as long fiber reinforced thermoplastics. These materials offer an increased precursor fiber length over their conventional extrusion compounded counterparts. The granular feedstock for these materials is highly anisotropic with bundles of fibres aligned along the granule axis. After flow through nozzle, runner and gates in an injection moulding machine, the fibres become more uniformly dispersed in the mould cavity. The fibres are oriented more randomly in the moulded part, to the extent that controlled pyrolysis of the matrix polymer in a component may leave the shape retained by the residual fiber skeleton intact. The rheology in the mould cavity, therefore, differs from that of the feedstock. Some aspects of the rheology of this class of mouldable thermoplastic fiber composite have been reported by Gibson, and Gibson, Corscadden & McClelland using an instrumented moulding machine nozzle; fiber bundles are still observed in polymer taken from the nozzle region in spite of the preshearing history. It is now a requirement for materials selection that an understanding of both high shear rate and in-cavity rheology is established for design practices. This places a requirement for at least a reproducible flow curve to be available, which can be fitted by a simple curve fit for injection mould filling simulation software.

Converging flow in the entry into a die or gate is expected to be particularly important with high Trouton ratios of about 100 reported for a long fiber moulding compound by Gibson, and Gibson & Williamson. For long glass fiber in a nylon matrix Gibson has shown that the entry pressure drop through a moulding machine nozzle has a minimum at less than an included angle of 40°. This appears to be most pronounced at high flow rates, with the pressure drop almost independent of entry angle at lower flow rates. Corscadden has reported an increase in entry pressure drop with entry angle between 60° and 140° for long glass fiber in polypropylene using a ram extruder, with a maximum at about 120°, and with a minimum at less than 40° using an injection moulding rheometer at 5000 s^{-1} shear rate. Some effect of the die diameter has been found with dough moulding compound (DMC) materials, but the effect of convergence ratio from the feed barrel diameter is unknown. All reported data are in a mixed shear and stretching flow regime at high shear rates. These observations relate to an imposed die taper entry configuration and this may differ from the natural die entry angle which the material follows in a 180° entry angle.

The extreme anisotropy of the feedstock provides the opportunity to measure along the fiber and transverse components in a defined geometry of flow such as a parallel plate rotational rheometer. With both steady shear and dynamic modes available, this provides a more fundamental characterisation and may allow rules for combining various sources of data for this type of material to be explored.

Since these compounds are used exclusively for injection moulding of engineering components, the type of flow which is characterised in this study is likely to be afflicted with pressure fluctuations and granule memory effects on a level which will not be as dramatic in commercial operations when the material will be plasticised on melting.

In commercial applications, materials are employed with a fiber loading (in weight %) from 30 to 60%. The fiber characteristics always dominate the mechanical properties. The influence of processing techniques and microstructure on the mechanical properties are addressed in the parallel study of this working party. The microstructural characterisation of these materials has been addressed for this family of materials for fiber length, orientation and dispersion by previous workers, however there has been little investigation into the passage of these materials through convergent flow.

Fiber length attrition is reported to be brought about predominantly by the screw preplasticisation in the injection moulding machine. Secondary attrition processes do occur at high shear rates which are of less significance.

Fiber orientation and dispersion play a far greater role in the flow characterisation. There is no clear picture of the mechanisms of how these fiber composites pass through flow constrictions with minimal fiber attrition which is evident from the dramatic melt fracture which occurs on elastic recovery of the fibres during die exit.

The determination of fiber orientation for these has been approached by a number of workers using image analysis and image processing from polished sections taken through moulded components and flow channels. In a section through the composite, intersected fibres appear as ellipses which are light against a darker matrix background. These fields of view are converted into binary images by image processing. The orientation of the fibres can be determined from the angle of the major and minor axis of the ellipse relative to fixed reference axes in three dimensional space. It is customary to set the predominant flow direction as the X-axis in simple geometries. In mould filling studies, in a rigid fiber system, the fibres tend to be aligned by shear forces on entering a die and misaligned (relative to the flow direc-

tion) upon divergence. This gives rise to the classical 'fountain flow' mechanism, associated with the advancing flow front in mould cavities.

The active participants in this collaboration are identified in the text as follows:

Laboratory

1. BASF Aktiengesefischaft, LudwigsWen, Germany.
2. Solvay Central Lab., Bruxelles, Belgium.
3. ICI Materials, Wilton, UK.
4. Shell Chemical Research Centre, Louvain-la-Neuve, Belgium.
5. DuPont de Nemours & Co., Engineering Technical Lab, Wilmington, USA.
6. Hoechst Celanese, Summit, USA.
7. Technical University of Denmark, Lyngby, Denmark.
8. National Research Council Canada, Quebec, Canada.
9. Hoechst AG, Kunststoff-Forschung, Frankfurt, Germany.
10. University of Karlsruhe, Germany.

This report was prepared for publication by: R.S. Bailey[1] and D.J. Groves ([1]ICI Technology, PO Box 90, Wilton, Middlesbrough, Cleveland TS90 8JE, UK), for the Working Party on Structure and Properties of Commercial Polymers, of the Commission on Polymer Characterisation and Properties, Macromolecular Division. The full details are to be found in Pure Appl. Chem. *1997,* ***69****, 2541–2565.*

Studies on biodegradable poly(hexano-6-lactone) fibers 1. Structure and properties of drawn poly(hexano-6-lactone) fibers (Technical Report)

Synopsis: Using high molecular weight (M_n = 80 000) Poly(hexano-6-lactone) (PCL*), tough and high tenacity PCL monofilaments with various draw ratios (undrawn to 9 times drawn) were prepared by melt-spinning. The relationship between microstructure and properties of the PCL fibers is described in this current IUPAC Technical Report. Analysis of microstructure of the drawn PCL fibers by wide-angle X-ray diffraction revealed typical c-axis orientation with an increase in crystallinity. It was also supported by sonic velocity measurements. The thermal, mechanical, and dynamic mechanical properties of the PCL fibers were affected significantly by draw ratio. DSC thermograms showed that the melting temperature and the enthalpy of fusion increased with draw ratio. The temperature dependence curves of dynamic viscoelasticity showed that the temperature at *tan* δ peak of α dispersion corresponding to the glass transition temperature shifted toward higher temperature and the peak value of *tan* δ decreased with draw ratio. The dynamic storage modulus and the sonic modulus increased with draw ratio. These results are due to the increase in crystallinity and molecular orientation with drawing, and are responsible for an increase in tensile tenacity as well as knot tenacity of the PCL fibers.

This report was prepared for publication by: Masatsugu Mochizuki[1], Kazuo Nakayama[2], Renyuan Qian[3], Bing-Zheng Jiang[4], Matsuo Hirami[1], Toshio Hayashi[5], Toshiro Masuda[6] and Akio Nakarnia[7] ([1]Research and Development Center, Unitika Ltd., 23, Uji-Kozakura, Uji, Kyoto 611, Japan; [2]National Institute of Materials and Chemical Research, Tsukuba, Ibaraki 305, Japan; [3]Institute of Chemistry, Academia Sinica, Beijing 100080, China; [4]Changchun Institute of Applied Chemistry, Acadernia Sinica, Changchun, Jifin, China; [5]Research Institute for Advanced Science and Technology, Osaka Prefecture University, Sakai, Osaka 593, Japan; [6]Department of Material Chemistry, Kyoto University, Yoshida, Sakyou-ku, Kyoto 606-01, Japan; [7]4-1-5 Midoridai, Kawanishi, Hyogo 666-01, Japan) for the Working Party on Structure and Properties of Commercial Polymers, of the Commission on Polymer Characterisation and Properties, Macromolecular Division. The full details are to be found in Pure Appl. Chem. *1997,* ***69****, 2567–2575.*

The name 'ε-caprolactone' is commonly used rather than the IUPAC nomenclature 'hexano-6-lactone'; hence the abbreviation PCL, based on the former, is used throughout this Technical Report.

Properties and units in the clinical laboratory sciences: Part III. Elements (of properties) and their code values (Technical Report) (IUPAC–IFCC 1997)

Synopsis: We have prepared a coding scheme for the elements (concepts) in the subject field 'clinical laboratory sciences'. The scheme uses code values taken from international coding schemes that provide code values for the elements in the various subspecialties which are represented in the subject field. The coding scheme for elements is accessible on Internet from the C-NPU Home page address: http://inet.uni-c.dk/home/ifcc_iupac_enpu

Preface

The present document is the third part of a series on properties observed in the clinical laboratory sciences initiated in 1987.

The series will comprise the five general parts (I–IV and XI) and a series of special parts:

I Syntax and semantic rules
II Kinds-of-property
III Elements (of properties) and their code values

IV Properties and their code values
V Properties and units in Thrombosis and Haemostasis
VI Properties and units in IOC prohibited Drugs
VII Properties and units in Inborn Errors of Metabolism
VIII Properties and units in Clinical Bacteriology
IX Properties and units in Trace elements
X Properties and units in General Clinical Chemistry
XI Coding systems—structure and guidelines
XII Properties and units in Clinical Pharmacology and Toxicology
XIII Properties and units in Reproduction and Fertility
XV WWW databases
XVI Properties and units in Clinical Allergology

The size and complexity of part III, IV and XV is such that they will be presented in electronic format. The overall aim is access by electronic media of: 'Compendium of terminology and nomenclature of properties in clinical laboratory sciences'. 'Glossary of terms in quantities and units in clinical chemistry'. 'Properties and units in the clinical laboratory sciences'.

Definitions

code value: result of Applying a coding scheme to an element in a coded set.

coding scheme: collection of rules that maps the elements of one set on to the elements of a second set.

international coding scheme identifier, ISCI: identifier assigned to uniquely identify a registered coding scheme for use in information interchange.

Subject field: section of human knowledge, the borderlines of which are defined from a purpose-related point of view.

NOTE—In terminology science and its practical applications, the subject field is determined through the establishment of systems of concepts.

Term list: collection of terms to be subjected to further terminology work.

Introduction

Authoritative coding schemes in the health care domain are much needed for the electronic exchange of information on assays across language and cultural barriers.

In the clinical laboratory sciences there is a tradition for systematic expression of laboratory examination and the number of examinations performed is considerable, that is 5 to 10 per inhabitant per year.

To facilitate data exchange, a coding scheme for terms indicating properties has been prepared (part IV of this series). The elements (words, concepts, building blocks) of these terms for properties are listed as a term list in the present document in the form of a coding scheme comprising:

1. An international coding scheme identifier, and a code value representing a concept.
2. The linguistic expression of the concept in English and in some other language.

The listings are given both in code value order and in alphabetic order. The size of the listings is considerable, and they are therefore accessible on Internet only. This also facilitates updating.

This report was prepared for publication by: I. Bruunshuus[1], Wilhelm Frederiksen[2], H. Olesen[1] and I. Ibsen[1] ([1]Dept. of Clinical Pharmacology Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark; [2]Dept. of Clinical Microbiology, Statens Serum Institute, Copenhagen, Denmark. Please forward comments to: *H. Olesen, Dept. Clin. Pharmacol. Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), 20 Tagensvej, DK-2200 Copenhagen, Denmark. Fax: +45 35 45 27 45; email: qukb7642@inet.uni-c.dk or iibsen@rh.dk), for the Commission on Nomenclature, Properties and Units (C-NPU), Clinical Chemistry Section, Chemistry and Human Health Division (Technical Report), and the Committee of Nomenclature, Properties and Units (C-NPU), Scientific Division, from the International Federation of Clinical Chemistry (Recommendation 1997).*
The full details are to be found in Pure Appl. Chem. *1997, **69**, 2577–2582.*

Properties and units in the clinical laboratory sciences: Part IV. Properties and their code values (Technical Report) (IUPAC–IFCC 1997)

Synopsis: To facilitate and to assure correct electronic transmission of request and report on clinical laboratory properties over cultural and linguistic barriers, a systematic nomenclature has been prepared for a series of laboratory specialities.

Each defined property has been given a unique code value preceded by the coding scheme identifier: NPU.

The NPU code value and its adhering code value string for each term allow expression of the concept according to local script, idiom or conventions.

The coding scheme is accessible on Internet from C-NPU Home page address http://inet.uni-c.dk/home/ifcc_iupac_cnpu.

Scope

The coding scheme prepared is intended as a repository of code values and terms of properties to be used in the transfer of information on such properties through computing and telecommunication equipment used in the health services.

Preface

The document is the fourth part of a series on properties measured in the clinical laboratory sciences initiated in 1987.

The series will comprise the five general parts (I–IV and XI) and a series of special parts:

I Syntax and semantic rules
II Kinds-of-property
III Elements (of properties) and their code values
IV Properties and their code values
V Properties and units in Thrombosis and Haemostasis
VI Properties and units in IOC prohibited Drugs
VII Properties and units in Inborn Errors of Metabolism
VIII Properties and units in Clinical Bacteriology
IX Properties and units in Trace elements
X Properties and units in General Clinical Chemistry
XI Coding systems—Structure and guidelines
XII Properties and units in Clinical Pharmacology and Toxicology
XIII Properties and units in Reproduction and Fertility
XV WWW databases
XVI Properties and units in Clinical Allergology

The size and complexity of part III and IV is such that their lists will be presented in electronic format only.

The overall aim is access by electronic media of:

'Compendium of terminology and nomenclature of properties in clinical laboratory sciences'.

'Glossary of terms in quantities and units in clinical chemistry'.

'Properties and units in the clinical laboratory sciences' (the present series of documents).

Introduction

The variety of properties observed in the domain of the Clinical Laboratory Sciences is well over 5000. The number of properties observed is 5 to 10 per inhabitant per year in industrialised countries.

An increasing part of the billions of requests and reports is transmitted by electronic means, mostly by code values from a local coding scheme.

The expression of the meaning of a code value is according to local habit, rules and conventions. This often is not readily transformed to coded sets from other coding schemes.

To facilitate inter region electronic communication, the European standard ENV 1614:1995 has presented a system of concepts based on for a systematic nomenclature to function as a bridge between local dialects.

Based on this system of concepts and on the European standard ENV 12435:1996, that deals with the presentation of results, terms have been elaborated and codified for communication between clinical laboratory information systems and other health information systems.

A basic document for further description and clarification is 'Compendium of terminology and nomenclature of properties in the clinical laboratory sciences', while details of the syntax and semantic rules are given in.

This report was prepared for publication by: H. Olesen[1], D. Kenny[2], I. Bruunshuus[1], I. Ibsen[1], K. Jorgensen[3], R. Dybkaer[4], X. Fuentes-Arderiu[5], G. Hill[6], P. Soares De Araujo[7] and C. McDonald[8] ([1]Dept. of Clinical Pharmacology Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark; [2]Dept. of Clinical Biochemistry, Our Lady's Hospital for Sick Children, Dublin 12, Ireland; [3]Retired. Formerly Dept. of Clinical Biochemistry KB 3.01.1, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark; [4]Dept. of Standardisation in Laboratory Medicine, Kommunehospitalet Copenhagen, Denmark; [5]Dept. of Clinical Biochemistry, Ciutat Sanitària i Universitària de Bellvitge, Barcelona, Spain; [6]Dept. of Clinical Chemistry, Hospital for Sick Children, Toronto, Canada; [7]Dept. of Biochemistry, IQUSP, São Paulo, Brazil; [8]Regenstrief Inst. for Health Care, Indiana University School of Med., Indianapolis, Indiana, USA. Please forward comments to: *H. Olesen, Dept. Clin. Pharmacol. Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), 20 Tagensvej, DK-2200 Copenhagen, Denmark. Fax: +45 35 45 27 45; e-mail: qukb7642@inet.uni-c.dk or iibsen@rh.dk.) for the Commission on Nomenclature, Properties and Units (C-NPU), Clinical Chemistry Section of the Chemistry and Human Health Division, (Technical Report 1997), and the Committee of Nomenclature, Properties and Units (C-NPU), Scientific Division, from the International Federation of Clinical Chemistry (Recommendation 1997). The full details are to be found in* Pure Appl. Chem. *1997, **69**, 2583–2591.*

Properties and units in the clinical laboratory sciences: Part IX. Properties and units in trace elements (Technical Report) (IUPAC–IFCC 1997)

Synopsis: This document is the first Technical report-recommendation on the presentation of trace elements and their values in clinical laboratory sciences from International Federation of Clinical Chemistry and International Union of Pure and Applied Chemistry. It forms part of the ongoing effort to standardise requests and reporting of laboratory data for transmission across cultural and linguistic domains, without attempting to standardise the routine language used by clinicians and laboratory practitioners.

Other documents deal with syntax, kinds-of-property, and properties and units used in other areas of clinical laboratory sciences.

The document is accessible on Internet from C-NPU

Home page address: http://inet.uni-c.dk/home/ifcc_iupac_cnpu/

Preface

This document is the result of cooperation between the Commission on Toxicology of the International Union of Pure and Applied Chemistry (IUPAC) and the Committee/Commission on Nomenclature. Properties and Units of the International Federation of Clinical Chemistry (IFCC) and IUPAC.

The document is the ninth part (IX) of a series on properties examined in the clinical laboratory sciences, initiated in 1987.

The series will comprise:

I Syntax and semantic rules
II Kinds-of-property
III Elements (of properties) and their code values
IV Properties and their code values
V Properties and units in Thrombosis and Haemostasis
VI Properties and units in IOC prohibited Drugs
VII Properties and units in Inborn Errors of Metabolism
VIII Properties and units in Clinical Bacteriology
IX Properties and units in Trace elements
X Properties and units in General Clinical Chemistry
XI Coding systems—structure and guidelines
XII Properties and units in Clinical Pharmacology and Toxicology
XIII Properties and units in Reproduction and Fertility
XV WWW databases
XVI Properties and units in Clinical Allergology

Foreword and scope

Basic research in biology and medicine and innovations in laboratory methodology have greatly increased the range of properties available to medical practitioners to help them in decisions on diagnosis, treatment and prevention of disease.

The plethora is now such that the individual physician has insight in or understanding of only a limited number of properties offered to him from the various clinical laboratory specialities.

In the laboratory, local terms (jargon) may be well understood among colleagues, but they are not appropriate for communication with the outside world. Likewise, a laboratory and its local community of users, such as hospital or community physicians, may use a 'local dialect' of the language of clinical laboratory sciences which is well understood by all concerned, but when the communication possibilities are wider, even transnational, risks of serious misunderstanding arise.

In addition, the terminology used by one laboratory speciality may vary even within the speciality, and may be incomprehensible to another speciality. This is a minor inconvenience to the laboratory specialities, each one essentially operating within its own area of activity. However, for the user this is highly unsatisfactory and also may hinder treatment of the patient.

It is therefore essential to promote clear, unambiguous, meaningful and fully informative communication. Also, coherence of statements made within and between medical specialities, and uniformity in structure of presentation are to be striven for. This will facilitate transfer of information across cultural, alphabetic and language areas.

The purpose of this document is to Apply the IUPAC–IFCC recommended syntax structures for request and report, providing formats and terms of properties examined in the domain of Trace Elements, in order to facilitate unequivocal written or electronic communication between health care professionals.

The list of properties shown in this document is not exhaustive; it is a collection of realistic examples.

This report was prepared for publication by: R. Cornelis[1], X. Fuentes-Arderju[2], I. Bruunshuus[3] and D. Templeton[4] ([1]Laboratory of Analytical Chemistry, Institute for Nuclear Sciences, Universiteit Gent, Gent, Belgium; [2]Department of Clinical Biochemistry, Ciutat Sanitària i Universitària de Bellvitge, L'hospitalet de Llobregat, Barcelona, Spain; [3]Department of Clinical Pharmacology Q 7642, National University Hospital (Rigshospitalet), Copenhagen, Denmark; [4]Department of Clinical Biochemistry, Banting Institute, Faculty of Medicine, University of Toronto, Canada; Please forward comments to: *R. Cornelis, Laboratory for Analytical Chen-fistry, Instituut Nucleaire Wetenschappen, Universiteit Gent, Proeftuinstraat 86, B-9000 Gent, Belgium. Fax: +32 9 264 66 99; email: rita.cornelis@rug.ac.be), for the Commission on Nomenclature, Properties and Units (C-NPU), Commission on Toxicology (C-TOX) of the Clinical Chemistry Division (Technical Report 1997), and the Committee of Nomenclature, Properties and Units (C-NPU), Scientific Division, from the International Federation of Clinical Chemistry (Recommendation 1997).* *The full details are to be found in* Pure Appl. Chem. *1997,* ***69****, 2593–2606.*

Properties and units in the clinical laboratory sciences: Part XI. Coding systems—structure and guidelines (Technical Report) (IUPAC–IFCC 1997)

Synopsis: In ENV1614:1995 the system of concepts for properties in the clinical laboratory sciences has been elaborated and in part 1 of this series the syntax and semantic rules are presented.

The present document deals with the procedures for assembling the elements of a term for a property into a string of code values representing the intensional defini-

tion of a property. This is done by use of semantic links that ensure the correct localisation of the elements according to the syntax rules.

Further some special features needed as extensions to the general structure are presented.

Preface

The present document is the eleventh part (XI) of a series on properties examined in the clinical laboratory sciences, initiated in 1987.

The series will comprise the five general parts (I–IV and XI) and a series of special parts (in various stages of appearance in various media):

I Syntax and semantic rules
II Kinds-of-property
III Elements (of properties) and their code values
IV Properties and their code values
V Properties and units in Thrombosis and Haemostasis
VI Properties and units in IOC prohibited drugs
VII Properties and units in Inborn Errors of Metabolism
VIII Properties and units in Clinical Bacteriology
IX Properties and units in Trace Elements
X Properties and units in General Clinical Chemistry
XI Coding systems—structure and guidelines (*this document*)
XII Properties and units in Clinical Pharmacology and Toxicology
XIII Properties and units in Reproduction and Fertility
XV WWW databases
XVI Properties and units in Clinical Allergology

The size and complexity of part III, IV and XV are such that their lists will be presented in electronic format only. The overall aim is access by electronic media of: 'Compendium of terminology and nomenclature of properties in clinical laboratory sciences'. 'Glossary of terms in quantities and units in clinical chemistry'. 'Properties and units in the clinical laboratory sciences'.

Foreword and scope

The hardware and software facilities for electronic storage, transfer and handling of data are such that multipurpose databases can be made accessible at low cost without geographic restriction. The versatile and flexible underlying structures allow for ease of access and retrieval of data and gives presentation formats fully comparable to printed counterparts. Because of ease of use and because of the wider distribution of the information, misinterpretation is more likely to occur than in oral or written presentation for more restricted and culturally more homogeneous audiences. This necessitates some harmonisation/standardisation of data on transfer, while allowing local expression forms at sender and receiver ends. This in particular applies when specific concepts are to be expressed in different languages and different scripts.

This document is part of an ongoing international effort to agree on some sort of 'standardisation' of the transmission of 'laboratory results'. It centres on the description of two coding schemes developed for that purpose and gives guidelines and rules for their use.

The two coding schemes pertain to:

1. Coding scheme 1: code values for elements (of properties)
2. Coding scheme 2: code values for properties and their units

Introduction

In the clinical laboratory sciences, much effort has been given to the presentation of the outcome of analytibil efforts. Thus a report from a laboratory may be presented as an equation:

Property = Result

The general rules for the left side of this equation are given in ENV1614:1995 and for the right side in ENV12435:1996.

Further details on formats for request and report are dealt with in the documents on syntax and semantic rules, and kinds-of-property and an extensive survey is in 'Compendium of terminology and nomenclature of properties in clinical laboratory sciences'.

These recommendations, standards and conventions as listed have been followed systematically in the coding schemes developed.

Although the formats apply to the majority of properties examined, some extensions and special features are needed in the daily routine application.

In the following a description of the coding schemes for properties and their elements are presented, with emphasis on special features, as are some guidelines for their use.

This report was prepared for publication by: H. Olesen[1], D. Kenny[2], R. Dybkær[3], I. Ibsen[1], I. Bruunshuus[1], X. Fuentes-Arderiu[4], G. Hill[5], P. Soares De Araujo[6] and C. Mcdonald[7] ([1]Dept. of Clinical Pharmacology Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark; [2]Dept. of Clinical Biochemistry, Our Lady's Hospital for Sick Children, Dublin 12, Ireland; [3]Dept. of Standardisation in Laboratory Medicine, Kommunehospitalet Copenhagen, Denmark; [4]Dept. of Clinical Biochemistry, Ciutat Sanitària i Universitaria de Bellvitge, Barcelona, Spain; [5]Dept. of Clinical Chemistry, Hospital for Sick Children, Toronto, Canada; [6]Dept. of Biochemistry, IQUSP, São Paulo, Brazil; [7]Regenstnef Inst. for Health Care, Indiana University School of Med., Indianapolis, Indiana, USA. Please forward comments to: *H. Olesen, Dept. Clin. Pharmacol. Q 76.4.2, Copenhagen University Hospital (Rigshospitalet), 20*

Tagensvej, DK-2200 Copenhagen, Denmark. Fax: +45 35 45 27 45; email: ifcc-iupac-cnpu@inet.uni-e.dk or iibsen@rh.dk), for the Commission on Nomenclature, Properties and Units (C-NPU), Clinical Chemistry Section, of the Chemistry and Human Health Division (Technical Report 1997), and the Committee of Nomenclature, Properties and Units (C-NPU), Scientific Division, from the International Federation of Clinical Chemistry (Recommendation 1997). *The full details are to be found in* Pure Appl. Chem. *1997, **69**, 2607–2620.*

Properties and units in the clinical laboratory sciences: Part XIII. Properties and units in reproduction and fertility (Technical Report) (IUPAC–IFCC 1997)

Synopsis: This document is the first technical report—recommendation on the presentation of properties in reproduction and fertility and their values in clinical laboratory sciences from The International Society of Andrology, International Federation of Clinical Chemistry and International Union of Pure and Applied Chemistry. It forms part of the ongoing effort to standardise requests and reporting of laboratory data for transmission across cultural and linguistic domains, without attempting to standardise the routine language used by clinicians and laboratory practitioners.

The document is accessible on Internet from C-NPU Home page address: http://inet.uni-c.dk/home/ifcc_iupac_cnpu

Preface

This document is the result of cooperation between the International Society of Andrology and the Committee/Commission on Nomenclature, Properties and Units of the International Federation of Clinical Chemistry (IFCC) and the International Union of Pure and Applied Chemistry (IUPAC).

The present document is the thirteenth part (XIII) of a series on properties observed in the clinical laboratory sciences, initiated in 1987.

The series will comprise the five general parts (I–IV and XI) and a series of special parts:

I Syntax and semantic rules
II Kinds-of-property
III Elements (of properties) and their code values
IV Properties and their code values
V Properties and units in Thrombosis and Haemostasis
VI Properties and units in IOC prohibited Drugs
VII Properties and units in Inborn Errors of Metabolism
VIII Properties and units in Clinical Bacteriology
IX Properties and units in Trace Elements
X Properties and units in General Clinical Chemistry
XI Coding systems—structure and guidelines
XII Properties and units in Clinical Pharmacology and Toxicology
XIII Properties and units in Reproduction and Fertility
XV WWW databases
XVI Properties and units in Clinical Allergology

Foreword and scope

Basic research in biology and medicine and innovations in laboratory methodology have greatly increased the range of properties available to medical practitioners to help them in decisions on diagnosis, treatment and prevention of disease.

The plethora is now such that the individual doctor has insight in or understanding of only a limited number of properties offered to him from the various clinical laboratory specialities.

In the laboratory, local terms (jargon) may be well understood among colleagues, but they are not appropriate for communication with the outside world. Likewise, a laboratory and its local community of users, such as hospital or community physicians, may use a 'local dialect' of the language of clinical laboratory sciences which is well understood by all concerned, but when the communication possibilities are wider, even transnational, risks of serious misunderstanding arise.

In addition, the terminology used by one laboratory speciality may vary even within the speciality, and may be incomprehensible to another speciality. This is a minor inconvenience to the laboratory specialities, each one essentially operating within its own area of activity. However, for the user this is highly unsatisfactory and also it may hinder treatment of the patient.

It is therefore essential to promote clear, unambiguous, meaningful and fully informative communication. Also coherence of statements made within and between medical specialities, and uniformity in structure of presentation is to be strived for. This will facilitate transfer of information over cultural, alphabetic and language areas.

The purpose of this document is to apply the IUPAC–IFCC recommended syntax structures for request and report, providing formats and names of properties observed in the domain of Reproduction and Fertility, in order to facilitate unequivocal written or electronic communication between health care professionals.

The list of properties shown in this document is not exhaustive.

The main background document is the WHO laboratory manual for the examination of human semen and sperm-cervical mucus interaction.

This report was prepared for publication by: H. Olesen[1], A. Giwercman[2], D. M. de Kretser[3], D. Mortimer[4], H.

Oshima[5] and P. Troen[6] ([1]Department of Clinical Pharmacology Q 7642, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark [2]Department of Growth and Reproduction JMC 5064, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark; [3]Institute of Reproduction and Development, Clayton, Victoria, Australia; [4]Sydney Andrology, Sydney WF, Sydney, Australia; [5]Department of Urology, Tokyo Medical and Dental University, Tokyo, Japan; [6]University of Pittsburgh Medical Center, Pittsburgh, USA. Please forward comments to: *H. Olesen, Dept. Clin. Pharmacol. Q 76.4.2, Copenhagen University Hospital.*

Tagensvej 20, DK-2200 Copenhagen, Denmark), for the Commission on Nomenclature, Properties and Units (C-NPU), Clinical Chemistry Section, of the Chemistry and Human Health Division (Technical Report 1997), the International Society of Andrology (Recommendation 1997) and the Committee of Nomenclature, Properties and Units (C-NPU), Scientific Division, from the International Federation of Clinical Chemistry (Recommendation 1997). The full details are to be found in Pure Appl. Chem. *1997, **69**, 2621–2638.*

News

Committee on Science and Technology in Developing Countries (COSTED)

The following are extracts from the minutes of the 25th COSTED Executive Committee meeting, Irbid-Amman, Jordan, 25–27 February 1997.

Chairman's opening remarks

The Chairman greeted the host country dignitaries and acknowledged the generous support by Yarmouk University in hosting the meetings and facilitating the preparations for the meeting. He recalled the warm opening remarks of Prof. Kamal and congratulated Dr Owais for the excellent arrangements. He placed on record deep appreciation for the services of the outgoing members of the Executive Committee, Prof. M.G.K. Menon, Prof. R.R. Daniel, Prof. R.D. Keynes, Dr D.A. Bekoe, Dr D. Ouazar, Dr I. Head, Dr H. Leutner, Dr D. Norse and Dr T. Freyvogel. He welcomed the attending new EXCOM members, Prof. M. Addy, Dr E.M. Krieger, Dr D.M. Polter, Dr Alain Ruellan. He noted that Prof. K. Gulamov, Dr Su Jilan, O. Kitani, Prof. C.N.R. Rao and Mr V. Zharov expressed regret at their inability to participate. The Chairman also thanked ICSU for continued support, co-operation and the opportunity provided for a COSTED presentation at the 25th ICSU General Assembly. The co-sponsorship and sustained support of UNESCO was graterully acknowledged. The contribution and continuing support by the National Members of COSTED–IBN was also warmly acknowledged. The Chairman also underscored the challenging goals ror COSTED—exemplified by the extraordinary range of themes on the agenda—and urged everyone to combine vision and pragmatism in the work.

Scientific secretary's report

A substantive report was made by the Scientific Secretary consisting of two parts, (i) a formal report on the activities of the Central Secretariat during 1996 and (ii) proposals on future need based activities in three broad areas, (a) Capacity Building in Science, (b) Technology Management and (c) Intellectual Property Rights. The report was very well received. The ensuing discussions endorsed the proposed activities as highly relevant. The committee recognised that technology management and IPR are highly important and relevant to the COSTED mandate. These areas have not been adequately addressed in developing countries nor have they been publicised at the national level. It was noted that COSTED–IBN has had a successful history of co-operation in basic sciences and it is timely to include technology aspects in its programmes. In view of the heterogeneous nature of developing countries, priorities in technology development and R&D need to be carefully identified as well as factors influencing co-operation in technology development. In summary, the committee was highly supportive of the new initiative to strengthen the T in COSTED as R&D in technology is perceived to contribute not merely to economic growth but to ensure sustainable economic growth. The Scientific Secretary proposed an activity for a capacity building programme in technology management in co-operation with the United States International University, San Deigo. The proposal was warmly received. It was recommended that the programme begin at the Asian level and be extended as rapidly as resources permit to other regions.

Agenda item 11.7—regional secretaries' reports

The following presentations were made on the regional COSTED–IBN activities.

COSTED Western and Central Africa	Dr Addy
COSTED Asia	Ravichandran for Thyagarajan
COSTED–IBN Latin America	Prof. Allende
COSTED–IBN Arab Region	Dr Owais
African Biosciences Networks	Dr Ba
COSTED–IBN Southern & Central Africa	Dr Mokhele
AONBS	Dr Tanticharoen

The committee congratulated the COSTED–IBN Latin American Region for presenting an excellent example in successful networking as well as external fund raising for the networks. In general, the committee recognised the increased vibrancy and outreach of COSTED–IBN activities and expressed optimistic views about the progress made so far. The reports also indicated the heterogenity of the different regions of the developing countries, the distinct nature of successful activities in each region and their integral benefits to COSTED–IBN as a whole. Dr Allende stressed the need for COSTED–IBN to transcend ICSU and UNESCO and truly represent the science and technology activities as perceived by the regions. Dr Owais highlighted the need for sensitisation of policy makers in the Arab region to be of primary importance and urgency. Dr Ba in presenting the ABN report made a case for soliciting additional funds to ensure greater effectiveness and success of the ABN activities which have been recently curtailed due to paucity of funds. Dr. Tanticharoen offered to host short-term training courses and split PhD Sandwich courses (less than 12 months) at the NCGEB, Bangkok and invited COSTED–IBN to take advantage of the same.

The report or the Arab Regional Co-ordinating Committee Meeting held at Yarmouk University just prior to the ExCom meeting will be circulated in due course.

Following are highlights of the report of the Planning Session for COSTED in Africa presented by Dr Mokhele.

- Strengthen existing networks
- Themes selected for networks should address research from basic, applied and incorporate commercialisation of research results
- Communication infrastructure essential for networks to function
- COSTED–IBN should better exploit capacity found in the broader ICSU and *vice versa*
- A number of themes for networks were suggested (e.g. remote sensing, structural engineering analysis)
- COSTED must project what *competitive advantages* as an ICSU committee it has to offer
- COSTED's role in Science and Society
- Strengthen COSTED Regional secretariats.

Plans for COSTED in Africa (1997–2000); wherever possible, specific goals will be set for each year and progress will be reported in terms of these benchmarks.

1 Expand Natural Products Research Co-operation in Africa (NAPRECA) in West Southern Africa
   - 3 countries in each region networked by the next EXCOM meeting
2 Expand Biological Nitrogen Fixation Network
3 Establish network of researchers in Remote Sensing in 3 years
4 Enhance activities of network on structural engineering analysis.
5 Expansion of COSTED National Membership: All current ICSU National Members in Africa should join COSTED by next EXCOM. A vigorous campaign should be mounted.
6 Increase in number of National Academies of Science (Mokhele/Hassan: TWAS General Conference in Rio, September 1997)
7 Co-ordination of the activities of COSTED–IBN Secretariats in Africa and between these and the Central COSTED office in Madras
8 Strengthen the capacity of the Secretariats to play efflective co-ordinating and facilitating role

At the end of the reporting session considerable discussion of the role, mission and philosophy of COSTED–IBN followed. Members expressed wide ranging views which included the need for a panoramic view of the organisation not influenced by regional insights. Recognising the diversity of the regional situations it was recommended that in future the Central Secretariat's report needs to present a collage of a central coherent programme without imposing uniformity on the specific actions in the regions. Members recognised that the uniqueness of COSTED–IBN was based on the fact that COSTED–IBN's link to ICSU is well structured and so is the regional outreach of COSTED–IBN in the developing countries. This is a distinct advantage in ensuring the effective fulfilment of the objectives with which the organisation was set up. COSTED–IBN is free to concentrate on applied sciences as found appropriate since the ICSU Unions focus to a great extent on basic sciences. The EXCOM urged COSTED-IBN to strengthen co-operation with the ICSU Unions and Committees and enhance its visibility so as to attract a greater role as an advisory body to the ICSU family in matters relating to science and technology for development. COSTED–IBN was requested to help increase ICSU membership in Africa and recommend the representation of new and young scientists from the developing regions to ICSU. Members desired that a report from COSTED-IBN feature on the agenda of the TWAS General Committee meeting in September 1997 as is being done in the United Nations meeting of the Commission

for Sustainable Development, in New York.

The idea that COSTED–IBN should strive to function as a match maker between activities and funds was warmly received by institutions. It was recommended that COSTED–IBN adopt a two-pronged approach: by fostering networks to strengthen scientific activities and by fostering partnerships to strengthen technical and industrial collaboration in developing countries. The need for information on the centres of excellence to facilitate training of scientists between the regions was stressed. It was proposed that the regional secretariats prepare a diagram of their structures which could he integrated by the Central Secretariat to present an overall structure of the organisation.

ISCU Assessment Report *vis-á-vis* COSTED–IBN

A suggestive input from Mme Julia Marton-Lefevre was discussed extensively. Views ranged from, preference for non-governmental new members, potential role of COSTED–IBN and ICSU to play a high level advisory role in influencing governments for greater support for science and technology, appropriateness of a review mechanism for ICSU and 'sunset' provision for programmes. The following consensus emerged regarding the Assessment Report.

1 ICSU should, as a priority help build the capacity of groups of scientists in the developing countries to form national academics or societies which could become National Scientific Members of ICSU. COSTED–IBN should be given the mandate, funds and assistance to undertake this on behalf of ICSU.
2 COSTED–IBN should contact present National Scientific Members of ICSU in developing countries and assist them to fulfill their roles as Members of ICSU better.
3 COSTED–IBN should organise high level meetings of scientists and policy makers, making the case—for the role of science in the development process and organise appropriate follow-up actions to this.
4 The ICSU Secretariat should be expanded to include a development officer from ICSU to help fund raising and membership drive.
5 The COSTED–IBN Regional Secretaries should be encouraged to set up regional scientific networks and link these to the appropriate International Scientific Unions and Committees.

New regional netwoks

Biodiversity networks

It was generally agreed that Biodiversity Networks in developing countries are extremely important. However, recognising that there are major global efforts already afoot in this area, COSTED–IBN should strive to

1 gather data on existing efforts in biodiversity in various regions to unearth local capacities and bottlenecks
2 identify the priorities and needs as perceived by the regions
3 facilitate the plugging in/hooking on of regional initiatives in biodiversity to important programmes like DIVERSITAS.
4 promote exchange of ideas and policy options for the South

Energy networks

The Committee endorsed in principle the proposal for an energy network proposed by the Scientific Research Council of Jamaica. It was noted that this was essentially an information exchange network. Mme Marton-Lefevre brought to the attention of EXCOM that ICSU has been anxious in the past few years to attempt a meaningful initiative in this area and she encouraged COSTED–IBN to explore this possibility. The Chairman asked the Scientific Secretary to examine the feasibility of an energy network for developing countries. Such networks in special programmatic areas could eventually be either expanded or disbanded as found appropriate.

CSC—COSTED–IBN collaboration: Project CREN

The proposal was presented by the Scientific Secretary who pointed out that COSTED–IBN collaboration in this initiative is solicited in view of CREN expanding beyond the Commonwealth Countries. The EXCOM approved the proposal in principle and members offered a number of suggestions for co-operation. These ranged from working in partnership with other ICSU bodies in this area, IUPAC/CHEMRAWN, IUGS (waste disposal) China CAST (Cleaner production) ISSS (training). The Scientific Secretary was requested to pursue COSTED–IBN collaboration with CREN in the light of the above suggestions.

Brain storming session on general issues

1. Concept of networking in COSTED–IBN

Stimulating discussions led to the following broad ideas on the concept of networking in COSTED–IBN.

Definition of Network: Organised manner of linking scientists, technologists and scientific and technical institutions and bodies in a continuous manner for a common objective.

Advantages:

- provides scope for the birth of new networks
- acts as a tool for access to information at national, regional and international levels.

- facilitates exchange of experience, research methodology and formulation of joint strategies for common problems.
- provides directionality for efforts based on collective expertise
- facilitates pooling of resources
- facilitates grass root level participation and contribution
- presents a collective voice and therefore a better credibility in fund raising and efflective implementation.

Disadvantages:
- local disparities may sometimes hinder networking
- success depends on the motivation, participation and response of the networking partners
- sustainance of the network depends on the correct identification of objectives and priorities and periodic review of the same

Action:
- Each regional secretariat to prepare a working draft on the regional experience in networking in all areas of science.
- The central secretariat to integrate the drafts and come up with a paper highlighting the successes and failures of the regional networks and the factors influencing them (e.g. political, financial, psychological, etc.)
- based on this study, the regional and central secretariats to formulate a strategy for a concerted action plan for regional networking in new areas under the COSTED umbrella.
- to address two important prerequisites for networking: (i) strengthening the secretariat through access to electronic communication, (ii) getting access to services and resources for dissemination.

2. The Mission of COSTED

It was unanimously felt that the objectives of COSTED–IBN as defined in the constitution are comprehensive and broad enough. The purpose of the brainstorming session was to arrive at a definition or action to operationalise these objectives. In this context, views expressed were strongly in favour of strengthening the linkages between S and T as well as between T and economic development. ICSU has upheld the voice for science all along. However, the ICSU assessment report considers applied areas of science and the development process to be of high priority in the future. Thus COSTED–IBN must take into account the emerging trends and priorities in global S&T. It was pointed out that COSTED–IBN will increasingly be called upon to play an advisory role on science for policy and policy for science and this should be amply reflected in the attempt to define the goals. Based on the above discussions. a draft of COSTED's key objectives prepared by Dr Allende was revised as follows:

1 to strengthen, organise and integrate the scientific communities of the developing regions of the world.
2 to stimulate and facilitate the participation of the scientists and scientific institutions of the developing countries in the activities of international science and technology.
3 to generate programmes and projects that increase the scientific and technological capacity of developing countries to address problems relevant to their cultural and socio-economic development and or international scope.
4 to provide advice on science and technology policies to governments and other concerned Institutions in the developing world.

New books

COSTED has announced the availability of the following books.

Concepts in biotechnology. Editors: D. Balasubramanian, C.F.A. Bryce, K. Dharmalingam, J. Green & Kunthala Jayararnan. Published by Universities Press (India) Limited 3-5-820, Hyderguda, Hyderabad 500 029, A.P. India. Distributed by Orient Longman Limited. Contact the nearest Orient Longiman Office or mail your order to Orient Longman Limited, 3-6-272 Himayatnagar, Hyderabad 500 029, A.P., Tel.: (040) 240294, 240305, 240306, 240391, fax: (040) 240393,

E-mail: info@orienth.globemail.com

ed.co@orientlongman.sprintrpg.ems.vsnl.net.in

This textbook is the outcome of a COSTED–IBN project on curriculum development in biotechnology for undergraduate study, especially for students in developing countries. It is designed to provide a strong base in this emerging, interdisciplinary area which holds great promise for economic development.

The early chapters review the structure and function of biological molecules and living cells, and the way in which cellular structure and function is controlled by the genetic makeup of the cell. The diverse technologies associated with the application of living systems in select areas—such as health care, agriculture, animal systems, bioprocess technologies—are then described. Finally, the impact of biotechnology on the environment, and ethical and social implications of this technology are discussed.

- A model textbook in Biotechnology for undergraduate and postgraduate students.
- Covers the fundamental principles and concepts which form the basis for the subject.
- Illustrates their applications in select areas such as

health care, agriculture, animal systems, bioprocess technologies and the environment.
- Provides an insight into the impact of biotechnology on international competition, trade, societies in developing countries, their economy, way of life and social structure.
- Numerous assignments and self assessment exercises designed to reinforce key concepts.
- Every chapter has a Further Reading List.
- The glossary of technical terms further enhances the usefulness of the book

Contents

1 From Cell Biology to Biotechnology
2 Interplay of Macromolecules in a Living Cell
3 Structural and Functional Dynamics of the cell
4 Gene Structure and Expression
5 Gene Technology
6 Protein Engineering and Design
7 Enzyme Technology
8 Bioprocess Technology: Exploitation of Microorganisms
9 Bioprocess Technology: Exploitation of Animal Cells
10 Immunotechnology
11 Biotechnology as a New Frontier in Health
12 Plant Biotechnology
13 Animal Biotechnology
14 Bioinformatics and Pattern Recognition in DNA and Protein Sequences
15 Marine Biotechnology
16 Impact of Biotechnology on the Stability of the Environment
17 Biotechnology, international competition, and Economic, ethical and social implications in developing countries
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The Editors

Prof. D. Balasubramanian, Director, Centre for Cellular and Molecular Biology, Hyderabad, India.

Prof. C.F.A. Bryce, Dean, Faculty of Science, and Head, Department of Biological Sciences, Napier University, Edinburgh, Scotland.

Prof. K. Dharmalingawn, Head and Coordinator, School of Biotechnobgy, Madurai Kamaraj University, Madurai, India.

Dr J. Green, School of Biolechnology, Napier University, Edinburgh, Scotland.

Prof. Kunthale Jayaranm, Head, Centre for Biotechnology, Anna University, Madras, India.

Regional Land Cover Changes Sustainable Agriculture and their Interactions with Global Change (with focus on South Asian countries). Editor Veena Ravichandran. Foreword: Dr Rodney Nichols, President and CEO of New York Academy of Science & Chairman, COSTED. 440 pp. Price: Rs450/US$13. Postage within India: Rs.33, outside India: US$4. Contact: COSTED International Secretariat, 24 Gandhi Mandapam Rd, Chennai-600025, India.

This book brings forth the Proceedings of the International Workshop held in Chennai, India, between 16 and 19 December 1996, organised by the Committee on Science and Technology in Developing countries (COSTED) and funded by the European Commission. This is the outcome of COSTED's efforts to bring to the attention of the governments and the policy makers the prevailing trend towards cornmodity-centered land use planning leading to considerable land diversion, erosion, removal of forest canopies contributing to global changes.

The book focuses on the heavily populated Southern Asian Region where there is an urgent need to address food security through sustainable agricultural practices against this scenario. The workshop brought together 60 senior experts, government officials, policy makers and NGOs from the European Union and the Southern Asian region in the field of agriculture, land use policy and global issues.

The proceedings of the workshop brings forth the research needs and institutional capacities, regional issues, global scenario technological advances opportunities for management cooperation, networking, concerted actions and delivery systems role of government, public policies, world trade agreenients,

The book provides a wealth of information on the most recent scenario in land use and sustainable agriculture for the South Asian region. The suggested readership for this book is:
- Academicians & Researchers
- Social Scientists
- Scientific Advisors to the Govt.
- Policy makers
- NGOs
- Technologists

A valuable reference for South Asian region University and research libraries. The Proceedings also includes a list of participants which enables the reader to contact the concerned person for further information on the relevant subject.

Contents

1 Country reports on the South Asian scenario in agriculture, land use & global change implications
2 Land cover changes and their driving forces
3 Global change scenario-current future trends
4 Institutional constraints and socioeconomic dimensions of land use and productivity
5 Panel Discussion on issues of concern to the region
6 Recommended action plan.

News of interest to our members

Prof. John G. Topliss will receive the 1998 ACS Division of Medicinal Chemistry Award at the 26th National Medicinal Chemistry Symposium at Virginia Commonwealth University, Richmond, on 14 June. Prof. Topliss is a Titular Member of the Medicinal Chemistry Section Committee.

Prof. Daryle Busch, Secretary of the Inorganic Chemistry Division, has been nominated as one of two candidates for President-Elect of the American Chemical Society.

The European Physical Society, Section of Macromolecular Physics, will hold a European Conference on Macromolecular Physics: Morphology and Micromechanics of Polymers, Merseburg, Germany, 27 September to 1 October 1998. Further information can be obtained by writing to EPS'98, Martin Luther University of Halle-Wittenberg, Department of Materials Science, D-06099 Halle/S., Germany. Tel.: +49 3461 46 27 45; fax: +49 3461 46 25 35; E-mail: eps98@werkstoff.uni-halle.de/werkstoff/aww/eps/eps01.htm

Provisional Recommendations

Definitions of terms for diffusion in the solid state

Synopsis

This document provides definitions of terms and processes which are used in describing the migration of host and foreign species through solid materials. Both the phenomenological theory of diffusion and the detailed atomistic mechanisms by which atom transport occurs are treated. Also included are the various types of gradients such as electrical, chemical, thermal and mechanical, which provide the driving forces for diffusion.

Comments by 1 October 1998, to Prof. R. Metselaar, Laboratory of Solid State Chemistry and Materials Science, Technische Universiteit Eindhoven, Postbus 513, 5600 MB Eindhoven, Netherlands. Tel.: +31 40 2473122, fax: +31 40 2445619, e-mail: tgtvrm@chem.tue.nl

Conference Calendar

Visit http://www.iupac.org for complete information and further links

1998

Organic synthesis

28 June–2 July 1998
12th International Conference on Organic Synthesis (12-ICOS), Venice, Italy.
Prof. F. Nicotra, Departement of Industrial and Organic Chemistry, Univeristy of Milano, Via Venezian 21, I-20133 Milano, Italy. Tel.: +39 2 236 7613, fax: +39 2 236 4369, e-mail: nicotra@imiucca.csi.unimi.it

Heteroatom chemistry

5–11 July 1998
Fifth International Conference on Heteroatom Chemistry, London, Ontario, Canada.
Prof. Kim M. Baines, Department of Chemistry, University of Western Ontario, London, Ontario N6A 5B7, Canada. Tel.: +1 519 661 2166, fax: 519 661 3022, e-mail: kbaines2@julian.uwo.ca

Chemistry in Africa

6–10 July 1998
7th International Conference on Chemistry in Africa, Durban, South Africa.
Prof. T.M. Letcher, Department of Chemistry & Applied Chemistry, University of Natal, Durban 4041, South Africa. Tel.: +27 31 260 1395, fax: +27 31 260 3091, e-mail: 7icca@che.und.ac.za

Macromolecules

13–17 July 1998
37th International Symposium on Macromolecules (MACRO '98), Gold Coast, Australia.
Prof. R.G. Gilbert, Chemistry School, Sydney University, NSW

2006, Australia. Tel.: +612 9351 3366, fax: +612 9351 3329, e-mail: gilbert@chem.usyd.edu.au

Photochemistry

19–24 July 1998
XVII IUPAC Symposium on Photochemistry, Sitges, Spain.
Prof. Josep Font, Departament de Quimica, Universitàt Autonoma de Barcelona, Bellaterra, 08193 Barcelona, Spain. Tel.: +34 3 581 1255, fax: +34 3 581 1265, e-mail: PHOTOIUPAC98@cc.uab.es

Polymeric materials

20–23 July 1998
18th Discussion Conference on Macromolecules: Mechanical Behaviour of Polymeric Materials, Prague, Czech Republic.
P.M.M. Secretariat, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nám. 2, 162 06 Prague 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Chemical thermodynamics

26 July–1 August 1998
15th International Conference on Chemical Thermodynamics, Porto, Portugal.
Prof. Manuel A.V. Ribeiro da Silva, Department of Chemistry, Faculty of Science, Rua do Campo Alegre, 687, 4150 Porto, Portugal. Tel.: +351 2 6082821, fax: +351 2 2008628, e-mail: risilva@fc.up.pt

Novel aromatic compounds

2–7 August 1998
9th International Symposium on Novel Aromatic Compounds (ISNA-9), Hong Kong.
Prof. Henry N.C. Wong, Department of Chemistry, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong. Tel.: +852 2609 6344, fax: +852 2603 5057, e-mail: hncwong@cuhk.edu.hk

Pesticide chemistry

2–7 August 1998
9th International Congress on Pesticide Chemistry, London, UK.
Dr John F. Gibson, Scientific Secretary, The Royal Society of Chemistry, Burlington House, London W1V 0BN, Tel.: +44 171 437 8656, fax: +44 171 734 1227.

Solubility phenomena

5–8 August 1998
8th International Symposium on Solubility Phenomena, Niigata 950-2181, Japan.
Prof. Kiyoshi Sawada, General Secretary, Faculty of Science, Niigata University, Niigata 950-21 81, Japan. Fax: +81 25 262 6265, e-mail: issp@sc.niigata-u.ac.jp

Chemical education

9–14 August 1998
15th International Conference on Chemical Education: Chemistry and Global Environmental Change, Cairo, Egypt.
Prof. Saad S.M. Hassan, Department of Chemistry, Faculty of Science, Ain Shams University, Cairo, Egypt. Tel.: 202 483 1836, fax: +202 284 2123, e-mail: iupac15@asunet.shams.eun.eg

Carbohydrate symposium

9–14 August 1998
19th International Carbohydrate Symposium, San Diego, CA, USA.
Prof. David A. Brant, ICS 98 Symposium Secretariat, Department of Chemistry, University of California, Irvine, CA 92697-2025, USA. Tel.: +1 714 824 8976, fax: +1 714 824 1372, e-mail: ics98@uci.edu

Physical organic chemistry

16–21 August 1998
14th International Conference on Physical Organic Chemistry, Florianopolis, Brazil.
Prof. Eduardo Humeres, Department of Chemistry, Universidade Federal de Santa Catarina, Campus Universitario-Trindade, 88040-900 Florianopolis, Brazil. Tel.: +55 48 231 9219, fax: +55 48 231 9711, e-mail: humeres@mbox1.ufsc.br

Coordination chemistry

31 August–4 September 1998
33rd International Conference on Co-ordination Chemistry, Florence, Italy.
Prof. Ivano Bertini, Chairman, University of Florence, 33rd ICCC Secretariat, Department of Chemistry, Florence 50121, Italy. Tel.: +39 55 2757 549, fax: +39 55 2757 555, e-mail: ICCC@rics1.lrm.fi.cnr.it

Medicinal Chemistry

6–10 September 1998
XVth International Symposium on Medicinal Chemistry, Edinburgh, Scotland, UK.
Dr J.F. Gibson, The Royal Society of Chemistry, Burlington House, London, W1V 0BN, UK. Tel.: +44 171 437 8656/440 3321, fax: +44 171 734 1227.

Electrochemistry

13–18 September 1998
49th Annual Meeting of the International Society of Electrochemistry, Kitakyushu, Japan.
Prof. Rika Hagiwara. Department of Fundamental Energy Science, Graduate School of Energy Science, Kyoto University, Sakyo-ku, Kyoto 606, Japan. Tel.: +81 75 753 5822, fax: +81 75 753 5906, e-mail: ise@g-chem.nucleng.kyoto-u.ac.jp

Chemistry of germanium, tin and lead

20–25 September 1998
9th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin & Lead (ICCOC GTL-9), Melbourne, Australia.

Prof. Dainis Dakternieks, School of Biological & Chemical Sciences, Deakin University, Geelong 3217, Australia. Tel.: +61 3 52 271318, fax: +61 3 52 271040, email: dainis@deakin.edu.au

Supramolecular science and technology

27 September–3 October 1998
1st International Conference on Supramolecular Science & Technology, Zakopane, Poland.
Prof. Marek Pietraszkiewicz, Chairman, Institute of Physical Chemistry, ul. Kaspazaka 44/52, 01-224 Warsaw, Poland. Tel.: +48 22 632 3221 (ext. 3226), fax: +48 39 12 0238, e-mail: pietrasz@ichf.edu.pl

Chemistry of natural products

11–16 October 1998
21st IUPAC symposium on the Chemistry of Natural Products, Beijing, China.
Prof. Xiaotian Liang, Chairman, Prof. Xibai Qiu, Secretary, c/o Chinese Chemical Society, PO Box 2709, Bejing 100080, China. Tel./fax: +86 10 625 68157, e-mail: qiuxb@infoc3.icas.ac.cn

Excitonic processes in condensed matter

2–5 November 1998
Third International Conference on Excitonic Processes in Condensed Matter, Boston, MA, USA.
Prof. William M. Yen, Department of Physics and Astronomy, University of Georgia, Athens, GA 30602-2451, USA. Tel.: +1 706 542 2491, fax: +1 706 542 2492, e-mail: wyen@hal.physast.uga.edu

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes, Osaka, Japan.
Prof. Yasuhiko Shirota, Faculty of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan. Tel.: +81 6 879 7364, fax +81 6 877 7367, e-mail: shirota@ap.chem.eng.osaka-u.ac.jp

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: +254 2 521003, fax: +254 2 520023, e-mail: p.sanchez@cgnet.com

Biodiversity and Bioresoures

27 June–1 July 1999
2nd International Conference on Biodiversity and Bioresources—Conservation and Utilization, Belo Horizonte, Minas Gerais, Brazil.
Prof. Alaide Braga de Oliveira, Faculdade de Farmacia—UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte, Brazil. Fax: +55 31 337 9076, e-mail: fernao@dedalus.lcc.ufmg.br

Polymerization methods

12–15 July 1999
39th Microsymposium, Advances in Polymerization Methods: Controlled Synthesis of Functionalized Polymers, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Organo-metallic Chemistry

18–22 July 1999
10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10), Versailles, France.
Prof. J.P. Genet, Laboratoire de Synthese Selective Organique et Produits Naturels, E.N.S.C.P.—UMR CNRS 7573, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France. Tel.: +33 1 44 276743, fax: +33 1 44 071062, e-mail: genet@ext.jussieu.fr

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.:

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+420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Kyoto University, Kyoto 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911, e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium (SAC 99), Dublin, Ireland.
Prof. Malcolm R. Smyth, Faculty of Science, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 704 5308, fax: +353 1 704 5503, e-mail: smythm@dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777, fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

IUPAC General Assembly

6–13 August 1999
Berlin, Germany.
IUPAC Secretariat, Tel.: +1 919 485 8700, fax: +1 919 485 8706, e-mail: secretariat@iupac.org

IUPAC Congress

14–19 August 1999
Berlin, Germany.
Gesellschaft Deutscher Chemiker–GDCh, PO Box 90 04 40, 60444 Frankfurt Am Main, Germany. Tel.: +49 69 7917 358/360/366, Fax: +49 69 7917 475, e-mail: tg@gdch.de

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MMC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169-50, Japan. Tel.: +81 3 5286 3120, fax: +81 3 3209 5522, email: w169988@mn.waseda.ac.jp

2000

Bio-organic chemistry

February 2000
5th IUPAC Symposium on Bio-Organic Chemistry (ISBOC-V), New Delhi, India.
Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 471 491 459, fax: +91 471 490 186.

High temperature materials chemistry

4–10 April 2000
10th International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), 52425 Jülich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Macromolecules

9–14 July 2000
38th International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Prof. Stanislaw Penczek, Polish Academy of Sciences, ul. Sienkiewicza 112, 90363 Lodz, Poland. Tel.: +48 42 81 9815, fax: +48 42 684 7126, email: spenczek@bilbo.cbmm.lodz.pl

Organic Synthesis

1–5 July 2000
13th International Conference on Organic Synthesis (ICOS-13), Warsaw, Poland.
Prof. M. Chmielewski, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, PO Box 58, Poland. Tel.: +48 22 631 8788, fax: +48 22 632 6681, e-mail: ichos@ichf.edu.pl

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on Chemical Thermodynamics, Halifax, Nova Scotia, Canada.
Dr Peter G. Kusalik, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia B3H 4J3, Canada. Tel.: +1 902 494 3627, Fax: +1 902 494 1310. e-mail: kusalik@is.dal.ca

Natural products

1 September 2000
22nd International Symposium on the Chemistry of Natural Products, Sao Paulo, Brazil.
Dr M. Fátima das G.F. da Silva, Universidade Federal de Sao Carlos, Depto. de Quimica, Via Washington Luiz, km 235, CP676, Sao Carlos, Brazil. Tel.: +55 16 274 8208, fax: +55 16 274 8350, e-mail: dmfs@power.ufscar.br

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV—c/o 11th IBS, Theodor-Heuss-Allee 25, 60486 Frankfurt/Main, Germany. Tel.: +49 69 7564 205, fax: +49 69 7564 201, e-mail: info@dechema.de

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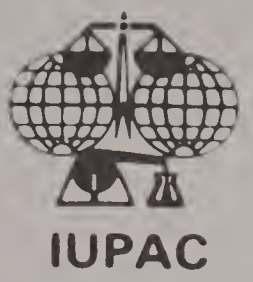

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Its objectives are:

- to promote continuing co-operation among the chemists of the member countries
- to study topics of international importance to pure and applied chemistry which need standardization, or codification
- to co-operate with other international organizations which deal with topics of a chemical nature
- to contribute to the advancement and understanding of pure and applied chemistry in all its aspects

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

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Chemistry International

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Blackwell
Science

0193-6484(199805)20:3:1-5

Printed in Great Britain by Alden, Oxford

ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

1998, Vol. 20, No. 4 (July)

Blackwell Science

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

PRODUCTION EDITOR: Howard Waller

All correspondence to be addressed to The Editor, Chemistry International, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Telephone: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org and http://www.iupac.org

Subscriptions

Six issues of *Chemistry International* will be published bimonthly in 1998 (one volume per annum) in January, March, May, July, September and November. The 1998 subscription rate including postage is GBP 75.00 (UK and overseas except North America) or USD 116.00 (US and Canada). The individual subscription rate is GBP 29.00 (UK and overseas except North America) or USD 42.00 (US and Canada). Microfiche subscriptions are available simultaneously with the printed edition, and microfilm at the end of the subscription year. Subscription orders may be placed directly with IUPAC's official publisher, Blackwell Science Ltd, PO Box 88, Oxford, UK; E-mail: journals.cs@blacksci.co.uk. Information on this journal can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

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Front cover: Participants at the RAQAL meeting which was held in conjunction with CHEMRAWN XI (see this issue, pages 99–102).

International Union of Pure and Applied Chemistry

CHEMRAWN XI

The latest in the series of CHEMRAWN Conferences was held on 15–20 March 1998 in Montevideo Uruguay. A summary of the conference is provided by Prof. Folke Ingman, President of Division V. This is followed by the Statement of the Meeting and of the Future Actions Committee as reported by Prof. Patrick Moyna, organizer of the conference.

CHEMRAWN XI, Montevideo, Uruguay, 15–20 March 1998

The eleventh CHEMRAWN Conference was arranged by Prof. Patrick Moyna (member of the CHEMRAWN Committee) and his co-workers at Facultad de Química, Universidad de la República in Montevideo. The topic of the conference was Environmental Chemistry and part of it was devoted to the Latin American Symposium on Environmental Analytical Chemistry. Approximately 250 scientists, mainly from Latin American countries, attended. The conference programme included 26 plenary lectures given by well known scientists and could be divided roughly into three categories:

- Methodological topics ranging from modern sampling techniques and speciation of trace metals in environmental samples using Flow Injection Analysis, to LC-MS-MS, to computational methods in atmospheric chemistry, to different kinds of quantitative spectroscopy involved in Process Analytical Chemistry.
- Quality assurance in Environmental Analytical Chemistry was in many respects the main theme of the conference. Several plenary lectures were devoted to this area including laboratory proficiency testing programmes. A condensed course on laboratory accreditation was also included in the conference.
- Discussions of several programmes aiming at monitoring environmental pollution. A report on the performance and results of a six-year German/Brazilian environmental research project in the industrial area of Cubatao showed how scientific collaboration can increase competence in developing countries and simultaneously yield results useful for political and other authorities. Monitoring programmes were discussed in several contributions. Strategies for the sustainable management of the environment were discussed against the background of results from a university collaboration in the Baltic region.

Several poster sessions were also included in the programme, and altogether some 45 posters covering the same groups of topics as above were discussed.

In connection with the conference, a meeting was also held by the Red para Análisis Químicos Ambientales en América Latina (RAQAL). This is a network aiming at improving competence and confidence among its members, mainly by running rounds of intercalibration. Prof. Joseph Tarradellas (Lausanne, Switzerland) and Prof. Dieter Klockow (Dortmund, Germany) have acted as advisors to the network during its 10 years of existence. The network has completed several rounds to date and now felt ready to undertake the production and certification of a reference material. This will probably consist of black beans, be produced in Santiago de Chile and be analysed by the members.

As a whole, CHEMRAWN XI provided a good overview of the newest developments in Environmental Analytical Chemistry. It also fulfilled the purpose of giving Latin American attendees an opportunity to come

Prof. P. Moyna welcomes delegates to CHEMRAWN XI

into contact with colleagues from more developed countries, particularly in the non Spanish-speaking parts of the world.

Folke Ingman, May 1998

Statement of the CHEMRAWN XI Meeting and Recommendations of the Future Actions Committee (F. Ingman (IUPAC), W. Figueiredo (Sao Paulo), D. Klockow (Dortmund), P. Moyna (CHEMRAWN), A. Pohland (Washington) and L. Ryden (Stockholm).

Introduction

On 15–20 March 1998, the CHEMRAWN XI Meeting at Montevideo, Uruguay, gathered specialists on environmental chemistry and environmental protection from 19 countries world-wide, 12 of them Latin American, to discuss the situation of the environment in Latin America, with particular reference to South America and the Rio de la Plata basin. The Conference was organized cooperatively by various groups in Montevideo, in particular the Universidad de Republica and the Intendencia Municipal de Montevideo, and several international institutions, most prominently the International Union for Pure and Applied Chemistry (IUPAC), the International Association of Environmental Analytical Chemistry (IAEAC), and the International Organization for Chemical Sciences in Development (IOCD).

The state of the environment in Latin America is deteriorating

The Conference concluded that the environment in Latin American countries is seriously and rapidly deteriorating as the heavy pollution of watercourses, land degradation, and soil and air contamination continues. Available data, among the many reported to the Conference, pointed to serious emissions of heavy metals, toxic organic compounds and untreated sewage from cities, industries and agriculture. These emissions constitute not only a threat to individuals, public health and the living environment and its biodiversity, but also a considerable economic loss for the countries concerned, due to the misuse of natural resources and investments.

Urgent action requires reliable information

The situation calls for urgent action. Although many sources of pollution are obvious and should be addressed immediately, a more systematic approach is needed. Therefore, reliable data will be of fundamental importance.

Such data will be necessary for all kinds of environmental actions, be they legal actions, or economic sanctions such as taxation measures. Most importantly, they will be needed to trace the sources of environmental impact, understand its consequences on ecosystems, and constructively address the causes of pollution. Research laboratories are prepared to take responsibility for data collection. The Conference was pleased that the RAQAL network—Red de Análisis Químico Ambiental en America Latina—of analytical chemical laboratories in Latin America is prepared to contribute to the required effort. The RAQAL network, which has existed since 1990, was meeting as part of the Conference. It has secured international support to ensure that the required expertise, instrumentation and methodological developments will be available for carrying out the proper analysis of environmental samples. The analytical chemistry community is willing to work on, for example, sampling strategies and methodologies for the quality control of analytical results. This first basic step will ensure a sound platform for further action.

Participants at the RAQAL meeting held in conjunction with CHEMRAWN XI.

Monitoring programmes are urgently called for

The scientists at the Conference concluded that it is urgent that laboratories in the region address the question of a large scale monitoring programme to survey the environment. This will provide a base both for environmental research and for environmental protection measures. The design and execution of emerging monitoring programmes needs relevant competence both regarding environmental science, and chemical and biological analysis. Just as in other parts of the world, adequate scientific institutions, not the least universities, would be the natural platform for the development of such a programme, and scientists at the participating institutions in Latin American countries are prepared to contribute.

Regional co-operation is essential

Pollutants do not recognize national borders, and a successful environmental programme must adapt to this fact. A monitoring programme should thus be international. The participating scientists are prepared to seek regional co-operation. In the longer term, the governments in the region, in agreement with the results of the UN Conference of Rio de Janeiro, 1992, and the Agenda 21 document, should take responsibility both for environmental surveillance and proper action, in order to preserve their natural heritage and the long-term capacity for sustainable development through environmental protection.

Quality and interdisciplinarity are essential

Environmental data will serve no purpose if they are not related to their effect on the environment and on humans. A successful monitoring programme will have to rely on co-operation between many fields of science, such as chemistry, biology, ecology, medicine, geography and hydrology, amongst others. The arrangements for interdisciplinary co-operation should be addressed appropriately and solved.

A strategy is needed for optimal results

A monitoring programme should, in the first place, develop a proper sampling strategy to ensure that analytical efforts give meaningful and interpretable data. The chemicals to be measured should include not only toxic substances, such as heavy metals and organic pollutants, but also other substances present in amounts that are deleterious to the environment. It is particularly important to include nitrogen and phosphorus, as they cause the ongoing eutrophication of bodies of water from poorly treated or untreated sewage from urban areas, or as run-off from agricultural land and associated industries. This is particularly urgent in countries where agriculture is a mainstay of the economy.

Environmental impact is due to pollution of air, water, soil and food. All these sources need to be monitored. Samples should be taken not only in open air or water but also from biological samples. Adequate data on pollution of water needs analysis of benthic long-lived organisms and the fish fauna. This makes it possible to identify substances hazardous to humans via food, in particular, seafood and fish. Databases should be set up of the toxic substances found in different matrices such as sediments, organisms and water.

Biological monitoring will give essential information on the ecological effects of pollutants. Environmental transport and the fate of xenobiotic compounds in the specific environment in Latin America should be taken into consideration. A search for specific toxicological endpoints in the flora and fauna, as well as in the human population, including ethnic minorities with specific food habits, need to be addressed.

Monitoring water quality

The status of the water in the region should be monitored most urgently. Clean water for everyone is a prerequisite for the health of the population. Most pollutants are emitted directly into water or finally end up in the water as atmospheric precipitation. The environmental status of the water can be used directly, either to design treatment actions or to redesign water management in urban areas, industry and agriculture.

Monitoring air quality

The measurement of air pollution is already ongoing in several industrial centres such as Cubatao at Sao Paulo in Brazil, because of a successful international co-operation project. Such measurements need to be prolonged and extended to include further areas. Increased car traffic in the big cities is a special concern for air quality, and will in itself have serious effects on public health. Meteorological competence is essential for such a programme.

Natural regions for monitoring exist

Monitoring water needs to take into account the natural borders for waters, the drainage basins and catchments. To improve the situation of a watercourse, all pollution sources within the drainage basin must be addressed. Upstream sources will heavily influence the downstream situation. Therefore, water monitoring should be organized around catchment areas, and mechanisms for the required co-operation in such areas should be found. Meteorological conditions define ar-

eas that influence each other heavily through air-borne pollution.

Experiences from the world

The Swedish participants at the Conference contributed their experiences from a long-term international co-operation programme for the protection of the Baltic Sea environment. This includes, to the best of our knowledge, the longest running monitoring programme in existence today. The monitoring of pelagic and benthic systems has been running in the Baltic Sea for more than 40 years. This started as, and continues to be, a research programme, although today the governmental authorities are responsible for routine measurements. It has been of utmost importance for the present improvement of the Baltic marine environment. The programme has served as a model when organizing other monitoring programmes of regional sea basins. Such a programme is now being carried out in the Gulf of Thailand. Other relevant experiences exist in several regions, e.g. for the Rhine River on the European continent and the Great Lakes district in North America.

A change in the position of scientists in the region

The number of problems is apparently overwhelming, but it should be clear that these problems can only be solved if the scientists from the region itself are involved as the main actors. An important part of the decisions and activities have to be taken and generated within the Region, otherwise local groups will always be struggling to keep up with the latest proposals coming from abroad. This is why an important part of the future goals have to concentrate on the training of the scientists at present working in Latin America. More importantly, stress has to be placed on the education of a generation of chemists capable of working independently, of developing and validating the needed analytical techniques, of establishing and running regional networks, and who are capable of raising the needed financial support from local and international groups and institutions.

IUPAC Fellows Programme

The IUPAC Fellows Programme was established by Council at Geneva. The purpose, eligibility and appointment conditions of the Programme are described below.

1. Purpose

The Fellows Programme has two purposes: (i) Formally recognizing the service of individuals who have served IUPAC and are no longer active with an IUPAC body, and (ii) Providing a ready means of communicating with former IUPAC volunteers, both to give them news about the Union and to be able to solicit their views and assistance in future IUPAC programmes.

2. Eligibility and Appointment

Fellowship is open to everyone who has completed work on one or more IUPAC bodies but is no longer currently active. However, Fellowship, once awarded, will continue even if the individual returns to active service on an IUPAC body.

A letter of thanks for IUPAC service will be sent by the President at the end of each biennium to individuals who are completing IUPAC service and have not then been elected or appointed to any IUPAC position in the following year. The individual will be invited to become an IUPAC Fellow and asked to confirm his/her acceptance.

Individuals who completed IUPAC service prior to the establishment of this Programme will also be eligible to become Fellows. Eligible individuals are invited to contact the Secretariat.

3. Benefits and Costs

The Fellow will be included on a special mailing list (preferably e-mail) to receive news of IUPAC activities from time to time. As needed, we may solicit views or assistance from all or some Fellows on issues or new programmes. Of course, comments and suggestions from Fellows will be welcome at all times.

The cost to the Secretariat for carrying out this portion of the Programme should be small, while the potential benefit to the Union of being able to consult a knowledgeable cadre of former IUPAC experts may be great. The goodwill generated by continuing contacts with these individuals and their ability to continue publicizing the Union's activities may also be of significant value to IUPAC. For these reasons it is not planned at present to charge any fee for Fellowship.

As a token of gratitude and as a means to strengthen the initial relationship with Fellows, a one-year free subscription to *Chemistry International* will be provided to all Fellows during the first year following the cessation of active service. After one year, Fellows will be invited to subscribe to CI directly through the Secretariat at a fee that will be set to cover anticipated costs to the Union.

An individual who is awarded Fellowship and later returns to active service in IUPAC for some period will receive a free subscription to CI during the period of active service but will not receive another free year on cessation of the second period of service. Also, while individuals whose service to IUPAC concluded prior to the establishment of the Programme may become Fellows, they will not receive free subscriptions to CI.

All members of IUPAC bodies, Fellows and representatives of National Adhering Organizations, Observer Organizations and Associated Organizations whose e-mail addresses are known to the the Secretariat, should have received a broadcast e-mail message recently. If you did not receive this message, and would like to receive IUPAC news by e-mail, please send your e-mail address and status (IUPAC body member, AMP member, etc.) to the secretariat: secretariat@iupac.org

World Science Conference

This Conference is expected to be a major event relating Science to social concerns. Attendance will be by invitation only. The material below was distributed by ICSU and we believe it will be of interest to readers of *Chemistry International*.

The 29th UNESCO General Conference last year adopted a resolution to organize a **World Science Conference** (WSC) in 1999. The Director General of UNESCO, Prof. F. Mayor, invited ICSU to cosponsor the WSC and the invitation was accepted by the ICSU Executive Board.

The Hungarian Government issued an invitation to host the Conference in Budapest from 26 June to 1 July 1999 and has offered very generous financial support. UNESCO and ICSU have accepted this kind invitation. The Hungarian Preparatory Committee has proposed a two centre arrangement for the Conference: the Budapest Convention Centre and facilities at the Hungarian Academy of Sciences.

The Conference is being co-organized by UNESCO and ICSU in co-operation with the relevant intergovernmental organizations of the United Nations system, and with nongovernmental organizations, such as the International Social Science Council (ISSC), the Third World Academy of Sciences (TWAS) and many other international and national partners.

ICSU will play a very important role in the 1999 World Science Conference. The Conference will address the entire phenomenon of science and its major issues at large, encompassing basic and applied science and facets relating to the natural and social sciences. The social and human sciences will be closely involved in addressing the social implications of overall scientific and technological progress, its particular breakthroughs, the relationship between science and development, as well as the ethical issues raised by the implementation of scientific research in specific areas. Emphasis will be laid on the increasing need for closer interaction and collaboration between both these realms of science throughout the themes discussed at the Conference.

The Conference aims to improve the public understanding of science and to obtain a renewed commitment of governments to fundamental and long-term research. The participants will be Government representatives, intergovernmental and nongovernmental organizations, policy makers, the scientific community and representatives of the public and other sectors of society.

The main outcome should be a world-wide innovative and pragmatic programme of action which will foster partnerships in science and the use of science for development and the environment. This programme, to be summarized in a 'Science Agenda-Strategy for Action', will be a framework for promoting co-operation and the coordination of efforts of governmental, intergovernmental, and nongovernmental bodies, the industrial sector and the scientific community. The ICSU will be responsible for the drafting of two scientific documents which will be the scientific input to the Agenda and the background documents for Forums I and II. The *Agenda*

for Science in the XXIst Century will be drafted by UNESCO for Forum III.

The Conference will be organized around three fora, each dealing with a major umbrella topic. Each Forum will consist of a number of sessions and gatherings devoted to the topics of the programme. Suggestions for topics are listed below:

Forum I: Science: its Achievements, Shortcomings and Challenges

- In-depth analysis of achievements of science (statistical approach: human longevity (The Biological Revolution) communication, transportation, etc.;
- Global Changes—achievements of international co-operation;
- Science and Industry: links between basic science, applied science and industrial development, role of foundations;
- The frontiers of science: prospective approach;
- Closing the gap between North and South;
- Sharing of scientific knowledge;
- Capacity Building and Education;
- Sustainability: Inter-Academy Panel.

Forum II: Science and Society

- Global problems of relations between Science and Society (including Science and Religion);
- Science, Environment and Society;
- Science and Media: how the media speaks of Science;
- Ethics and Responsibility of Scientists;
- Science and Industry: perception of science in industrial products: communication, transportation, food industry;
- Science and Peace;
- Science and Women.

Forum III: Toward a New Commitment to Science

- Commitment of scientists and nongovernmental scientific organizations;
- Commitment of intergovernmental scientific organizations;
- Commitment of civil society;
- Sustained political commitment;
- Commitment of industrial institutions and the private sector.

Goals of the World Science Conference

Through the World Science Conference, UNESCO's specific mandate in science will be exercised in order to draw up a guiding balance sheet of the main achievements of science, its impact on society and development, the outcome of international scientific co-operation, as well as of the challenges for the next century, particularly those concerning the application of science to development, the rational use of natural resources and environment protection. Also, just as a world-wide political commitment to education for all has been achieved following the World Conference on Education for All (1990, Jomtien, Thailand), a renewed commitment to science by UNESCO's Member States, at both national and international levels, will be sought through an innovative and pragmatic plan of action that would pave the way to UNESCO's Medium-Term Strategy beyond the year 2000.

The proposed World Science Conference will deal with the natural sciences and their impact on society. The social and human sciences will be closely involved in addressing the social implications of overall scientific and technological progress, its particular breakthroughs, the relationship between science and development, as well as the ethical issues raised by the implementation of scientific research in specific areas. Emphasis will be laid on the increasing need for closer interaction and collaboration between both these realms of science throughout the themes discussed at the World Science Conference.

The major objectives of WSC are to:

- undertake an in-depth analysis of the main achievements of science and its shortcomings; current problems and the forthcoming challenges in science with attention given to the role of science in the 21st century;
- contribute towards harmonizing the complex relations between science, society, development and environment, and promoting high ethical standards in scientific research and its applications, taking into consideration the specific cultural contexts of different regions;
- promote a world-wide endeavour geared towards the development of science, with particular attention to the needs of developing countries, and to enhance the interaction between scientists, public and private sectors and society;
- foster the renewal of international co-operation in the sharing of scientific knowledge in the age of information technologies, and give a new impetus to the development of science and its applications in the service of development, environmental protection, and the building of a culture of peace;
- engender the renovation of scientific education, particularly in the framework of 'education for all throughout life', and further improve the public understanding of science as part of culture through formal and informal processes and channels; and
- generate sustained political commitment to science

by UNESCO's Member States and the main stakeholders of international co-operation, through an innovative and pragmatic plan of action beyond the year 2000.

These objectives are to be met through a thoroughly conceived process encompassing the preparation of the Conference, the work of the Conference itself and its follow-up at national and international levels.

Stakeholders and partners

WSC will address and involve Member States' Governmental institutions, public and private sectors, scientists and nongovernmental bodies, as well as intergovernmental and international nongovernmental organizations involved in promoting and supporting science and scientific co-operation at regional and international levels. Particular attention will be given to involving women, youth and the media as partners and stakeholders of WSC.

Following wide consultations, the Director-General is of the view that the preferred status of the WSC would be that of a joint meeting of UNESCO and ICSU, organized in cooperation with the relevant intergovernmental organizations of the United Nations system, the International Social Science Council (ISSC), the Third World Academy of Sciences (TWAS) and other partners.

UNESCO, an intergovernmental body, and ICSU, a nongovernmental organization, have a unique mandate for, and authority in, promoting co-operation in science on the international stage, and they have been co-operating with each other for more than 50 years. Once the General Conference has endorsed WSC, co-operation will be officially sought with other interested bodies, namely, organizations of the United Nations system, intergovernmental organizations, international nongovernmental organizations and centres of excellence, financial institutions, major private foundations and regional and national scientific organizations. Preliminary contacts with the Organization for Economic Cooperation and Development (OECD), the World Bank, the International Association of Universities (IAU), the International Foundation for Science (IFS) and the Third World Academy of Sciences (TWAS) have indicated their wish to be involved in WSC.

Format and topics

The WSC will involve, in all its sessions, the participation and interaction of policy-makers, scientists and representatives of society. Efforts will be made to ensure that each Member State's delegation to the Conference will be composed of these three stakeholders. It is proposed that the sessions of WSC should revolve around the following three major umbrella topics:

- Science: its achievements, shortcomings and challenges;
- Interfaces of science;
- Towards a new commitment to science.

The first major topic aims to make the participants aware of the role of science and the responsibilities of the scientific community. The second topic seeks to involve focused discussions between scientists, governments, industrialists and representatives of the general public on the interfaces of scientific progress with societal requirements and expectations. The third topic follows logically, and aims to lead to an increased commitment to science by governments, policy-makers and other partners.

Each major topic will be dealt with in a limited number of sessions devoted to such issues or themes as: the history of science and its prospects for the future; science for economically viable, socially equitable and environmentally sound development; science and education, women's participation in science and technology; science and culture; ethical issues; commitment to science by governments and parliaments, scientists and intergovernmental and nongovernmental scientific organizations, etc. The elaboration of the key themes for the WSC working document will be selected by the Conference's scientific organizing committee, taking account of the recommendations made at the 29th session of the General Conference.

Outcome and follow-up

The main outcome of the WSC should be a world-wide innovative and pragmatic programme of action which will foster partnerships in science and the use of science for development and the environment. This programme, to be summarized in the document proposed to be entitled 'Science Agenda–Strategy for Action', will be a framework for promoting co-operation and the co-ordination of efforts of governmental, intergovernmental and nongovernmental bodies, the industrial sector and the scientific community. The draft document will be the subject of thorough consultations during the preparation of the Conference, before being discussed, finalized and endorsed by the Conference itself. A limited number of other documents, declarations and/or messages could be issued by the WSC as a goal-oriented framework for specific actions. By adopting and/or endorsing these documents, WSC will express the participants' determination to unite efforts and share responsibility for the promotion of science and its service to humankind.

WSC will also design an appropriate mechanism for overseeing its follow-up. The UNESCO Secretariat will be the focal body for co-ordinating this follow-up. In ad-

dition, UNESCO's action in science and that of its scientific committees and intergovernmental programmes will be enhanced through the follow-up to WSC, as will UNESCO's cooperation with ICSU, and all other partners and stakeholders. It may be appropriate to announce at the Conference two or three world-wide initiatives for immediate follow-up, e.g. the setting up of international centres of excellence to promote science-related activities such as science teaching and/or scientific research in certain regions.

Preparatory work

WSC will not follow the heavy and costly pattern of similar international conferences involving many regional and/or subregional preparatory meetings. It will, instead, take advantage of already planned regional meetings and small-scale international *ad hoc* meetings, involving natural and social scientists and policy-makers, to help prepare the main working documents of WSC. The National Commissions of UNESCO and field offices will be involved in the preparatory process from the very beginning, as will be all the divisions of the Science Sector and intergovernmental programmes of both the Science Sector (IGCP, IHP, IOC, MAB) and the Sector of Social and Human Sciences (MOST) as well as pertinent units and programmes of other sectors of UNESCO. Member States will be invited to designate national focal points for WSC in order to ensure their full participation in the preparatory work and the Conference itself. Use will be made of the new electronic communication technologies; a few forums through the Internet are envisaged to broaden consultations on the goals of the Conference and increase awareness of its usefulness.

Some meetings that may be conducive to WSC have already taken place (the International Conference on Donor Support to Development-Oriented Research in Basic Sciences, Sweden, June 1995; the Workshop on Basic Research for National Development Plans under Changing Economic Conditions, Slovenia, June 1997), or are under preparation (the Conference on Science and Technology Development in the Caribbean, Port-of-Spain, September 1998; the meeting of the Genoa Forum on science and culture, and regional forums on science and women).

The third World Science Report and the first World Social Science Report will be circulated at WSC to provide background to the Conference thematic sessions. In addition to intersectoral consultation and partnership within UNESCO's Secretariat, preparatory activities for the World Conference on Higher Education (to be held in 1998) will be coordinated with those of WSC.

News

News from the Extraordinary Session of the ICSU General Assembly, 25 April 1998, Vienna, Austria

The Extraordinary General Assembly of ICSU was held to consider proposed changes to the organization of ICSU as a result of an Assessment Report made by a group of eminent scientists. Given below are excerpts from the Summary of Proposals provided the members before the meeting and excerpts from the revised Statutes adopted by the General Assembly.

Recommendations for proposed action as a follow-up to the report on the assessment of ICSU

Introduction and summary of proposals

I. Introduction

The recommendations contained in this document are proposed by the Executive Board of ICSU as a result of a wide consultation undertaken immediately following the 25th General Assembly. Specifically, the sources for this document are as follows.

- The recommendations in the Assessment Report (which itself was based on exhaustive consultations with ICSU family members).
- Responses from Members to the Assessment sent to Paris in April–May 1997.
- Recommendations of the January meeting of the Executive Board.
- Recommendations of the March meeting of the Standing Finance Committee.
- Recommendations of the March meeting of the Standing Committee on Membership, Structure and Statutes.
- Discussion by the Officers of ICSU in June.

II. Summary of proposals

(a) ICSU's **name** to be changed to better reflect the organization's aims and membership.

(b) **Objectives:** somewhat expanded to better reflect today's reality.

(c) **Links with ICSU's Members and non-Members**
- Creation of the category of Multinational Scientific Member.
- Designated role for Ordinary Members of EB.
- Creation of Committee on National Participation.
- Creation of Committee on Union Participation.
- Encouragement of formation of national committees open to a variety of national organizations.

(d) **Governance Structure**
GA to remain essentially as is, however, there would be no need for an Assembly Finance Committee nor an Assembly Nominating Committee.

General Committee to be eliminated, and its function of priority setting and review transferred to a new Committee: Committee on Scientific Planning and Review (CSPR).

Executive Board to be enlarged to include six Officers and eight Ordinary Members (present EB has six plus six) and EB given additional responsibilities, with each person having specific duties.

Body of Officers to be given specific responsibilities and each person given a specific duty.

Secretariat to be slightly enlarged.

(e) **Priority setting and review process**
- Vice-President for Scientific Planning and Review.
- Committee on Scientific Planning and Review.

(f) **Grants**
- Elimination of automatic grants.
- Grants used as seed money in support of selected focused activities.

(g) **Interdisciplinary Bodies:** set up by the GA as either Scientific Committees, Programmes or joint initiatives with other bodies.

(h) **Science for Policy, Policy for Science**
- Increased responsibility to EB.
- EB to issue position papers when appropriate.
- Organization of forums for discussions involving national policy-makers.
- Standing Committees to be renamed (and some new ones created) as Policy Committees, addressing issues of policy and common concern for the well-being of science. These Policy Committees would be set up for 3-year periods, with the possibility of renewal by the GA.

Proposed Committees on:
- scientific planning and review (previously GC's duties);
- public understanding of science (new);
- governance (previously SCMSS);
- finance and fund-raising (previously SFC);
- National participation (new, although some aspects previously covered by OC);
- Union participation (new, although some aspects previously covered by GC);
- ethics and freedom in the conduct of science (previously SCFCS and SCRES);
- dissemination of scientific information (renaming of ICSU Press and its INASP, and including electronic publishing);
- developing countries (COSTED);
- the FSU and Central and Eastern Europe (COMSCEE);
- environment (ACE).

(i) **Voice and Outreach**
- Vice-President for External Relations;
- Creation of a Committee on the Public Understanding of Science;
- Dedicated staff person.

III. Recommendations for proposed action

1. ICSU's name

The name of the ICSU should be changed to reflect more accurately the type of organization it is:

ICS
INTERNATIONAL COUNCIL FOR SCIENCE
The organisation of International Scientific Unions and National and Multinational scientific bodies: formerly the International Council of Scientific Unions (ICSU).

CIS
CONSEIL INTERNATIONAL DES SCIENCES
L'organisation des Unions scientifiques et Institutions nationales et multinationales:
auparavant le Conseil International des Unions Scientifiques (CIUS).

The above recommendations were adopted by the General Assembly, with the exception of the change of the acronym by which the International Council for Science will be known. While the name change was accepted, the acronym will remain ICSU.

The following excerpts highlight the changes in statutes and governance resulting from the decisions taken at the General Assembly.

Statutes

I. Denomination and domicile

1 The International Council for Science, hereinafter called 'ICSU', is an international nongovernmental and nonprofit making scientific organization.

2 The International Council of Scientific Unions (ICSU) was created, following the dissolution of the International Research Council, in Brussels in 1931 where it had its first legal domicile. The name of the

Council was changed to ICSU: The International Council for Science at an Extraordinary General Assembly in 1998, but the acronym ICSU has been maintained. The present legal domicile of the ICSU is in Paris, France, where its Secretariat is located.

II. Objectives

3 The principal objectives of ICSU are:

(a) to encourage and promote international scientific and technological activity for the benefit and well-being of humanity;

(b) to facilitate coordination of the international scientific activities of its Scientific Union Members (see Statute 7) and of its National Scientific Members (see Statute 8);

(c) to stimulate, design, coordinate or participate in the implementation of international interdisciplinary scientific programmes;

(d) to act as a consultative body on scientific issues that have an international dimension;

(e) to encourage the strengthening of human and physical scientific resources world-wide with particular emphasis on the developing world;

(f) to promote the public understanding of science;

(g) to engage in any related activities.

4 In order to further the attainment of these objectives ICSU may, whenever appropriate:

(a) enter, through the intermediary of the national adhering organizations, into relations with the governments of their respective countries in order to promote scientific research in these countries;

(b) cooperate with the United Nations and its agencies, and with other international intergovernmental or nongovernmental organizations;

(c) provide, through suitable channels, information to interested parties and the public at large about progress in science and technology and its impact on society;

(d) undertake actions to strengthen the well-being and effectiveness of science and scientists;

(e) establish and promote programmes either within the ICSU family or in partnership with others.

The term 'National' as used in these Statutes and Rules of Procedure has no connotation other than denoting a Member admitted under the provisions of Statute 8.

5 In pursuing its objectives in respect of the rights and responsibilities of scientists, ICSU, as an international nongovernmental body, shall observe and actively uphold the principle of the universality of science. This principle entails freedom of association and expression, access to data and information, and freedom of communication and movement in connection with international scientific activities, without any discrimination on the basis of such factors as citizenship, religion, creed, political stance, ethnic origin, race, colour, language, age or sex. ICSU shall recognize and respect the independence of the internal science policies of its National Scientific Members. ICSU shall not permit any of its activities to be disturbed by statements or actions of a political nature.

III. Membership

6 Each Member has the obligation to support the objectives of ICSU, uphold the principle of the universality of science, and meet its financial obligations as appropriate. Members shall normally adhere to ICSU in one of two categories:

(a) Scientific Union Members, or

(b) National Scientific Members.

7 A Scientific Union Member shall be an international nongovernmental organization devoted to the promotion of activities in a particular area of science and shall have been in existence for at least 6 years.

8 A National Scientific Member shall be a scientific academy, research council, scientific institution or association of such institutions. Institutions effectively representing the range of scientific activities in a definite territory may be accepted as National Scientific Members, provided they can be listed under a name that will avoid any misunderstanding about the territory represented, and have been in existence in some form for at least 4 years.

9 The scientists of more than one nation may form a scientific body (academy, research council, etc.) for application as a National Scientific Member. No organization of scientists may adhere through more than one national membership.

10 Exceptionally, any other grouping of institutions acceptable to ICSU may be admitted to membership in category a) or b) on a case by case basis.

IV. Associates

11 Each Associate has the obligation to support the objectives of ICSU, uphold the principle of the universality of science, and meet its financial obligations as appropriate. Associates shall adhere to ICSU in one of three categories:

(a) National Scientific Associates

(b) International Scientific Associates

(c) Regional Scientific Associates

12 A National Scientific Associate shall be a scientific academy, research council or other comparable scientific organization that is potentially qualified, but not yet ready, for full national membership. National Scientific Associates shall normally be expected to apply for full membership after 6 years in this category.

In these Statutes and Rules of Procedure, international bodies are taken to mean those bodies to which appropriate organizations in all countries of the world are eligible to adhere.

13 An International Scientific Associate shall be an international nongovernmental organization in the natural sciences or an organization in a field cognate to those of ICSU, such as the humanistic, medical, social and technical sciences, whose association with ICSU is likely to be of mutual benefit or to advance the cause of science, and whose scientific activities do not fall primarily within the scope of a single Scientific Union Member. An International Scientific Associate shall have been In existence for at least 6 years. Such bodies shall not have voting rights.

14 A Regional Scientific Associate shall be a nongovernmental Scientific Academy, Science Council, or other scientific institution, to which scientists or scientific bodies from more than one nation adhere, whose association with ICSU is likely to be of mutual benefit and will facilitate the attainment of ICSU's objectives, and whose scientific activities do not fall primarily within the scope of a single Scientific Union Member. Such bodies shall not have voting rights.

V. Observers

15 A Member that has failed to fulfil its financial obligations (see Rule of Procedure 10.2) shall only have Observer status. Observers shall be expected to resume full membership in ICSU as soon as possible. Normally no Observer shall be allowed to remain so for more than 6 years.

VI. Decision-making bodies

16 The decision-making bodies of ICSU shall be:
(a) The General Assembly
(b) The Executive Board
(c) The Officers

...

X. Officers

32 (a) The **Officers** of ICSU are:
i. The President
ii. the Vice-President for Scientific Planning and Review
iii. the Vice-President for External Relations
iv. the Secretary-General
v. the Treasurer
vi. the Past-President or President-Elect

(b) The Officers are responsible for the day-to-day affairs of ICSU between meetings of the Executive Board. They shall meet as often as is deemed necessary, normally twice a year.

(c) The **President** shall hold office until the end of the ordinary session of the General Assembly following his or her election, this Officer shall not be eligible for re-election unless he or she had assumed the office of President as a result of a vacancy arising from the inability of his or her predecessor to complete a full term;

(d) The **Vice-Presidents** shall hold office for one term of 3 years, nonrenewable,

(e) The **Secretary General** and the **Treasurer** shall hold office for terms of 3 years, renewable once;

(f) The **immediate Past-President** shall serve as an Officer for a period of 18 months following the termination of the period of office held as President, to be succeeded until the next General Assembly by the **President-Elect.**

Circular letter to the ICSU unions from SCRES: the Standing Committee on Responsibility and Ethics in Science. Oslo, 19 April 1998

The International Council of Scientific Unions (ICSU) decided at its General Assembly in Washington DC, 24–27 September 1996, to establish a Standing Committee on Responsibility and Ethics in Science (SCRES). This decision represented a shift of attention from the freedom of scientists and scientific pursuits to the responsibility of science and technology. The Norwegian Research Council (NFR) offered to fund the secretariat, which was placed in Norway, a country with a developed research–ethical tradition. The director of SCRES is a Swedish philosopher of science and logic (Kathinka Evers), the chairman of the committee is a Norwegian philosopher of science (Matthias Kaiser). The other members of the committee are prominent scientists in the fields of physics (Hu Qiheng, China), genetics (Jose Cantu, Mexico), genetics and philosophy (Philip Kitcher, USA), neurobiology (Jean-Didier Vincent,

France) and one legal specialist (Joseph Onek, USA).

The committee of SCRES intends to hold one meeting annually, each time in a different country. The first meeting took place in Oslo, Norway, 19–22 June 1997, by invitation from the Norwegian Academy of Science. The second meeting will be held in Beijing, China, 8–13 June 1998, by invitation from the Chinese Academy of Science and Technology (CAST). The main task of the Oslo meeting was to establish the precise role that SCRES should play in the future: What are its main goals? What does SCRES aim to produce? Who is the intended audience?, etc. The initial discussion focused on how the committee intends to operate, and how it should communicate with other ICSU members. A website has been opened:

http://www.lmcip.jussieu.fr/icsu/SCRES/

The issues that SCRES most urgently needs to deal with are here made public in order to invite comments, information, and generally useful ideas from other parties; notably (though by no means exclusively), ICSU member-units. SCRES directs itself to all scientific communities, obviously, but not to them alone: it is vital that SCRES also succeed in addressing the general public and those politicians who represent the general public. SCRES is supposed to function as a focal point of discussions both within and beyond the scientific communities. One of its most important tasks is to improve the public understanding of science, and of problematic issues with respect to responsibility and ethics in science.

There are a wide variety of ethical issues which are important to science today, and they are likely to increase in number and complexity in the future. These issues include problems both of an internal nature and of an external one. Internal problems affect the conduct of science itself and the freedom of scientific inquiry, such as plagiarism and limitations on access to data. External problems concern developments in science and their effects on society, such as research on the human genome, the environment, race and intelligence, gender stereotyping, gene manipulation, embryo research, and weapons research.

SCRES' primary task is to help the scientific communities formulate general codes of conduct for scientific research: to see where such guidelines have already been developed, and, in those areas where none have yet been formulated, to assist in filling these gaps. If these codes, or standards, are not followed in a specific case, there must be special justifying grounds for this omission; grounds that should, upon request, clearly be stated. One issue of interest will concern the reasons for an apparent absence of ethical/legal guidelines: whether it is intentional (and, if so, by what and whose intentions), to what particular problems the gap is due, etc. ICSU has the mechanisms for adopting resolutions, and member-units may provide an entrée to many of the issues that SCRES needs to discuss.

So far, SCRES has found six topics especially provocative of problems of responsibility and ethics in science: (1) biotechnology and genetic engineering (e.g. cloning), (2) technology transfers with adverse environmental effects, (3) recent developments in the sciences of mind/brain, (4) standards for peer review and authorship in science, (5) the future of medical practice, and (6) quality assurance of scientific information on the Internet. Naturally, SCRES is open to further suggestions, and that is the main reason why we are writing this letter to you. We depend on scientists in all fields to inform us about ethical dilemmas, and perhaps about their possible resolutions. The committee has, for example, recently been faced with a concrete request from the Austrian embassy. They wish to know whether an international 'code of conduct' exists, that regulates the handling of biological material similar to the code of conduct for chemical weapons. SCRES knows of no such internationally valid code. There may be a lack of legislation and guidelines here, and we should be grateful if the appropriate ICSU member organizations and biological unions would contact us and give us their comments and suggestions.

We should also be interested in knowing about those of your meetings at which the presence of SCRES might be relevant and useful.

Thus with this letter we cordially invite you to inform us about

(a) any ethical dilemma that you conceive within your particular field of science, and that you should like to bring to SCRES' attention,
(b) any other view that you might have about SCRES: its structure, goals or methods, or anything else that you wish to comment on,
(c) those of your meetings at which the presence of a representative of SCRES might be relevant and useful.

We look forward to hearing from you.

Yours sincerely,

Dr Kathinka Evers, Executive Secretary, SCRES, The Research Park, Gaustadalléen 21, 0371 Oslo, Norway, Tel.: +47 2295 8778/fax: +47 2295 8492.

In related news, the following item describes a new European Group on Ethics in Science and New Technologies

Following a decision of the European Commission, a European Group on Ethics in Science and New Technologies will replace the Group of Advisers on the Ethical Implications of Biotechnology, set up in 1991. Delivering opinions on ethical implications of 'science and new technologies' in the framework of Community

legislation the new Group will have a broader mandate. Above the ethical implications of biotechnology, other fields such as the new information technologies, science and research will be covered. The new member, Prof. Ina Wagner from Austria, will be responsible for the fields 'Sociology–Informatics, Information Society'. Appointed for a period of three years, the 12 members will be completely independent of any political, economic and national interest and of the Commission. Their personal abilities and experience guarantees the multidisciplinary and multicultural composition of the group. The Commission will ask the European Group on Ethics in Science and New Technologies to deliver opinions, but the Group will also have the opportunity to adopt opinions on its own initiative. The Commission will appreciate a close co-operation with other European Union institutions.

Federation of European Chemical Societies, Annual Report, 1997

The Federation of European Chemical Societies is a voluntary association, the object of which is to promote cooperation in Europe between those nonprofit-making scientific and technical societies in the field of chemistry whose membership consists largely of individual qualified chemists and whose interests include the science and/or practice of chemistry. It was founded in 1970.

A powerful voice for chemists and chemistry: The Federation of European Chemical Societies (FECS), with the European Communities Chemistry Council (ECCC), through about 50 member societies together represent some 200 000 individual chemists in academia, industry and government in Europe.

The Structure of FECS: The scientific work of FECS is carried out through its Divisions (Analytical Chemistry, Food Chemistry, Chemical Education) and Working Parties. The EUCHEM Committee, operating within FECS, organizes high-level conferences and advises the European Science Foundation on its chemistry conferences. The European Communities Chemistry Council, reconstituted in 1996 in association with FECS, was founded in 1973, its primary object being to act in an advisory or representative capacity in matters relating to the science and practice of chemistry, particularly in relation to the European Commission.

The FECS Lecture 'Farbenspiel einer Ionenpumpe' (Colour changes of an ion pump) was given by Prof. Dieter Oesterhelt, Max-Planck-Institut für Biochemie, in September in Vienna during the 100th anniversary meeting of the Gesellschaft Österreichischer Chemiker.

The Award for Service to FECS was presented to Prof. Erno Pungor, Hungary, one of the founders and former Chairman of the Working Party on Analytical Chemistry.

The General Assembly of FECS met on 11–12 September in Vienna as the guests of the Gesellschaft Österreichischer Chemiker.

Analytical chemistry

Chairman: Prof. L. Niinisto, Helsinki University of Technology, Kemistintie 1, FIN-02150 Espoo, Finland. Tel.: +3589 4512600, fax: +3589 462373, e-mail: lauri.niinisto@hut.fi

Plans were made to launch the textbook on *Analytical Chemistry* in March 1998. A Who's Who in analytical chemistry in Europe is being prepared to help the ACTIVE and other student exchange programmes. Eurocourses planned include a joint Euro-American-Japanese course in Vienna in July 1998, courses on Quality matters and on Micro total analysis systems.

Much work is being undertaken in quality assurance and accreditation. The history of the Division will be published to mark its 25th anniversary in 1997.

The proceedings of Euroanalysis IX held in Bologna in 1996, with 700 participants, have been published in *Annali di Chimica*, the *Journal of Analytical and Environmental Chemistry*, Vol. 87, 1997. Euroanalysis X will be held in Basle on 6–11 September 1998.

Prof. L. Niinisto, past chairman of the Division, took over the Chairmanship in October, following the untimely death of Prof. Robert Kellner, Chairman of the Division since 1993 and an active participant for over 20 years.

Food chemistry

Chairman: Dr R. Battaglia, Migros Laboratories, Postfach 266, CH-8031 Zurich, Switzerland. Tel.: +41 1277 3140, Fax: +41 1277 3170, e-mail: Reto.Battaglia@mgb.ch

Conferences organized during 1997 included: 'Alimentacao Mediterranica' in Algarve in March; 'Bioavailability III' in Wageningen in May; 'In Vino Analytica Scientia' in Bordeaux in June; Laboratory Quality Assessment Issues Roundtable at AOAC meeting in US in September, 'EUROFOODCHEM IX' in Interlaken in September. The round table on Laboratory Quality Assessment Issues at the AOAC international meeting in San Diego continued the development of a close relationship between the Division and AOAC International.

Conferences in 1998: 'Structure and Functionality of Food Products', in Mrogowo in May; international symposium on immunology 'Chemical and Clinical Problems of Food Allergy', in Taormina in October. The publication Food Chem Window provides a compendium of student exchange programmes involving 36 research groups in 17 countries.

The second edition of the successful *Who's Who in Food Chemistry—Europe* will be extended to include relevant consulting/analytical/service laboratories.

Chemical education

Chairman Dr J.M.F. Gagan, Open University, 70 Manchester Road, Chorlton-cum-Hardy, Manchester M21 9UN, UK. Tel.: +44 (0)161 861 9823, fax: +44 (0)161 956 6811, e-mail: jm.gagan@open.ac.uk

The 4th European Conference on Research in Chemical Education (ECRICE) was held in York in September. Plans were made for the 1st European Conference in Chemical Education (ECCE) in Budapest in September 1998 for practitioners of chemical education at degree level. The 1998 FECS Lecture entitled 'Using the results of chemical education research' will be delivered by Prof. Alex H. Johnstone, University of Glasgow, Scotland, on 28 August during ECCE.

In 1998 a special edition of the *International Journal of Science Education* will publish papers illustrating current chemical education research activity in Europe.

Chemistry and the environment

Chairman: Dr A. Astrup Jensen, dk-TEKNIK Energy and Environment, 15 Gladsaxe Møllevej, DK-2860 Søborg, Copenhagen, Denmark. Tel.: +45 39 555904, fax: +45 39 696002, e-mail: aajensen@dk-teknik.dk

FECS societies have demonstrated increased interest in FECS activity in chemistry and the environment.

Plans were made for the conference 'Atmospheric Chemistry and Air Pollution', in Copenhagen on 26–28 August 1998. There is cooperation with the Italian Chemical Society in the planning of symposia for the conference 'Water in the Mediterranean Area, Conference on Quality and Quantity of Mediterranean Water Resources' in Sardinia on 11–18 October 1998.

An association with the journal Environmental Science and Pollution Research assists publicity—URL: http://www.ecomed.de/naturw/bereiche/titel/espr/welcome.htm

Plans were made to compile major textbooks in environmental chemistry. Contacts were developed with the European Environment Agency.

Computational chemistry

Chairman: Dr G. Naray Szabo, Hungarian Chemical Society, H-1027 Budapest, Fo u 68, Hungary. Tel.: +36 1201 6883, fax: +36 1201 8056, e-mail: naray@para.chem.elte.hu

The 2nd European Conference on Computational Chemistry (EUCO-CC2) was held in Lisbon in September, with about 200 participants. Plans are being made to organize a series of biannual summer schools on computational chemistry, the first being in Perugia, Italy in 1999.

Organometallic chemistry

Chairman: Prof. S. Pasynkiewicz, Warsaw, Technical University, Faculty of Chemistry, Koszykowa 75, PL-00-662 Warsaw, Poland. Tel.: +48 22 6286599, fax: +48 22 6605462, e-mail: pasyn@ch.pw.edu.pl

The XIIth FECHEM Conference on Organometallic Chemistry was held in September in Prague with 400 participants from 35 countries, including 120 students. The booklet *Organometallic Research Centres in Europe* contains details of over 2000 European organometallic chemists: http://www.vub.ac.be/ond/aosc/eoc/default.htm

History of chemistry

Chairman: Prof. H.A. Deelstra, University of Antwerp (UIA), Universiteitsplein 1, B-2610 Wilrijk, Belgium. Tel.: +32 38202 715, fax: +32 38202 734, e-mail: Labrom@uia.ac.be

The third edition of the highly successful *Guide for Museums with Collections on History of Chemistry and of Pharmacy* has been published. Preliminary plans are being made for publishing a history of European chemical societies.

Chemistry in the conservation of the cultural heritage

Chairman: Prof. F. Piacenti, Universita di Firenze, Dipartmento di Chimica Organica 'Ugo Schiff', Via Gino Capponi 9, I-50121 Firenze, Italy. Tel.: +39 55 2757 647, fax: +39 55 2757 660.

A programme has been launched to compile a 'Data Bank on Conservation Procedures of Stone, Metals Paintings'. Forms for this purpose have been published in *Science and Technology for Cultural Heritage*, **6**(1), 1997, edited by the CNR, Rome. A first set of data on the conservation of monumental buildings are compiled in an interactive databank. Conservation organizations in Italy have adopted the forms.

Electrochemistry

Chairman: Prof. J.W. Schultze, Heinrich-Heine Universität-Düsseldorf, Institut für Physikalische Chemie und Electrochemie, D-40225 Düsseldorf, Germany. Tel.: +49 211 811 4750, fax: +49 211 811 2803.

Plans were made for a meeting on 'Electrified Interfaces' in Porto on 5–10 July 1998, to consider the structure and dynamics of the solid/electrolyte interface. Contacts were developed with the European Commission to discuss relevant aspects of the Framework Pro-

gramme V. The development of a Eurocurriculum on electrochemistry is underway.

European Communities Chemistry Council

Chairman: Prof. F. Alderweireldt, University of Antwerp, Department of Chemistry, Groenenborgerlaan 171, B-2020 Antwerp, Belgium.
Secretary: Ms E.K. McEwan, Royal Society of Chemistry.

The ECCC comprises national societies, both learned societies and professional associations, representing 150 000 chemists, of whom 50% are under 35 years of age.

The designation European Chemist—EurChem

The professional designation, European Chemist (EurChem), is open to members of FECS member societies. European Chemist denotes academic qualification plus approved professional experience. There were 656 European Chemists at the end of 1997. The category-A schedule of qualifications lists the approved academic qualification requirements for candidates. Schedules of category-B and -C level qualifications are also maintained.

PhD training

Collaboration with the CEFIC led to a highly successful joint Seminar on PhD training in chemistry in Europe, with contributions from senior representatives of academia and industry and the European Commission. Participants considered how the providers of PhD training could best respond to the challenges of the future.

AllChemE

AllChemE mounted a highly successful Workshop on *University/Industry interaction—meeting the needs of the future through chemistry and chemical engineering.* It provided a valuable opportunity for chemists and chemical engineers to share information on good practice and highlighted innovative ways of matching postgraduate training with the research needs of a wide spectrum of industry.

The AllChemE report *Chemistry: Europe and the Future* was translated and published in French, German and Italian. Subtitled 'Science and technology to improve the quality of life in Europe', it aims to influence the future strategies of the European Commission and national bodies. It illustrates research activity in health and agriculture, new materials, energy and protection of the environment, likely to lead to inventions of high significance.

AllChemE. Alliance for Chemical Sciences and Technologies in Europe, comprising FECS/ECCC, CEFIC, CERC3 (Chairmen of European Research Councils Chemistry Committees), COST Technical Committee for Chemistry, EFCE (European Federation of Chemical Engineering), coordinates activities of mutual interest and promotes chemistry/chemical engineering in Europe.

Organization for the Prohibition of Chemical Weapons (OPCW)

The regulation of the international transfer of chemicals by the chemical weapons convention

The Chemical Weapons Convention prohibits the transfer, directly or indirectly, of chemical weapons to anyone. It also bans the use of chemical weapons and any involvement in preparations to use chemical weapons. In addition, the Convention regulates the production, processing, consumption, and—to some degree—the international transfer of toxic chemicals which can be converted into or used to produce chemical weapons. The majority of these chemicals are dual-use compounds, i.e. they have legitimate commercial applications. It follows from this that a substantial segment of the global chemical industry could be affected by the Convention's provisions. Compliance with the provisions of the Convention is monitored by a new international organisation, the Organisation for the Prohibition of Chemical Weapons (OPCV), based in The Hague, the Netherlands. Each State Party must also establish or designate a National Authority, which will be entrusted with ensuring compliance within its own territory with the obligations assumed.

For an adequate understanding of the Conventions scope, it is important to emphasise that, in accordance with its purposes, the expression 'chemical industry' comprises all chemical, pharmaceutical and agrochemical enterprises and other related sectors, which produce, process and/or consume those chemicals identified in the Convention for the purposes of declarations and routine inspections. This means that not only those firms or plants grouped within the traditional chemical industry sector may be subject to the Convention's provisions. A considerable number of companies from other industrial sectors will probably also be affected by the obligations arising from the Convention, and should therefore prepare themselves adequately if this is the case.

Chemicals to be monitored

The chemicals which are explicitly specified in the Convention for monitoring purposes cover a wide range and

include chemical warfare agents, as well as key precursors and more distant precursors. These chemical compounds or families of compounds are listed in the three Schedules of the Convention's Annex on Chemicals. Each of these Schedules has a different system of information and inspection requirements which is specified in the Verification Annex itself. These requirements are more stringent in the case of those chemicals which are deemed to pose a greater risk. The Verification Annex also includes restrictions on the international transfer of scheduled chemicals which are summarised below. Basic information on the three Schedules is as follows:

- **Schedule** 1 includes toxic chemicals and some precursors, and groups of these, with very limited or no commercial use. It includes known chemical weapons agents such as sulphur mustards, nitrogen mustards, lewisites, and the nerve agents tabun, sarin, soman and VX.
- **Schedule 2** includes toxic chemicals and precursors, as well as groups of chemicals which have limited commercial use. This Schedule includes chemicals with some degree of warfare potential, as well as several precursors, or groups of compounds, which may be part of the final stages of production of chemical weapons. An example of the chemicals included is thiodiglycol, an immediate precursor of sulphur mustards, which is used in several industrial processes such as the production of inks, metal plating, etc.
- **Schedule 3** includes, dual-use chemicals produced in large volumes. for industrial activities, and precursors which may be part of the initial stages of production of chemical agents. This category comprises highly toxic gases such as phosgene and hydrogen cyanide which were used as chemical warfare agents during World War I, but which at present are produced in large quantities for industrial and commercial use.

Restrictions on the international transfer of scheduled chemicals

The Verification Annex of the Convention establishes the following restrictions on the international transfer of scheduled chemicals:

Schedule 1 chemicals:
Export:

- Exports to States not Party to the Convention are prohibited;
- Exports can, be made to other States Parties only for justified non-prohibited (research, medical, pharmaceutical or protective) purposes and within a quantity which allows the purchasing State Party to keep an aggregate amount of such chemicals equal to or less than one tonne at any given time, and for such purposes.

Import:

- Imports from States not Party to the Convention are prohibited;
- Imports from other States Parties for justified non-prohibited (research, medical, pharmaceutical, or protective) purposes are allowed, and only within a quantity which allows the importing State Party to keep an aggregate amount of such chemicals equal to or less than one tonne at any given time, and for such purposes.

Other requirements:

- Any transfer of a Schedule 1 chemical from one State Party to another is required to be notified by both States Parties to the Technical Secretariat (OPCW) at least 30 days before the planned transfer;
- Every year, each State Party has to make a detailed annual declaration on transfers during the previous year. This declaration shall be submitted not later than 90 days after the end of that year and shall include specific information on each Schedule 1 chemical that has been transferred;
- Schedule 1 chemicals that have been transferred shall not be re-transferred to a third State.

Schedule 2 chemicals
Export:

- Three years after the entry into force of the Convention, the export of Schedule 2 chemicals to States not Party will be prohibited;
- During the interim three-year period, each State Party shall adopt the measures necessary to ensure that transfers of Schedule 2 chemicals to States not Party shall be used only for purposes not prohibited by the Convention. Such measures shall include requesting a certificate from the recipient State, which has to state, *inter alia*, that the transferred chemicals will be used only for purposes not prohibited by the Convention; that they will not be re-transferred; the types and quantities of the chemicals; their end-use(s); and the name(s) and address(es) of the end-user(s).

Import:

- Three years after the entry into, force of-the Convention, the import of Schedule 2 chemicals from States not Party will be prohibited.

Other requirements:

- States Parties are required to make initial and annual declarations on aggregate national data for the previous calendar year on: (a) the quantities of each Schedule 2 chemical produced, processed, consumed, imported and exported; and (b) a quantitative specification of import and export for each country involved.

Schedule 3 chemicals
Export:

- Each State Party shall adopt the measures necessary to ensure that transfers of Schedule 3 chemicals to States not Party shall be used only for purposes not prohibited by the Convention. Such measures shall include requesting from the recipient State a certificate which has to state, inter alia, that the transferred chemicals will be used only for purposes not prohibited by the Convention; that they will not be re-transferred; the types and quantities of the chemicals; their end-use(s); and the name(s) and address(es) of the end-user(s);
- Five years after the entry into, force of the Convention, the need to establish other measures regarding transfers of Schedule 3 chemicals to States not Party will be considered.

Other requirements:

- States Parties are required to make initial and annual declarations of aggregate national data for the previous calendar year on: (a) the quantities of each Schedule 3 chemical produced, imported and exported; and (b) a quantitative specification of import and export for each country involved.

Further requirements

The Convention also establishes further requirements in relation to activities to be carried out with scheduled chemicals, as well as with other chemicals which are widely used in industry. These requirements—in particular, those related to the production, processing, and consumption of the above-mentioned chemicals—should be taken into account as complementary information when the international transfer of such chemicals is being considered. These requirements are included in the Verification Annex of the Convention. Some comments on them follow:

Schedule 1 chemicals: Large-scale production of these chemicals is prohibited, and any existing stocks exceeding one tonne must be destroyed. However, each State Party may, at any given moment, retain a total of up to one tonne of these chemicals for the development of means of protection and for medical, pharmaceutical or research activities. The production of these chemicals is authorised only for research, medical, pharmaceutical or protective purposes, and shall be carried out only in a single small-scale facility approved by the State Party, and in other facilities as set forth in Part VI of the Verification Annex, in the context of restrictions which are clearly established in the Convention. These facilities are subject to systematic inspections by the Technical Secretariat of the OPCW

Schedule 2 chemicals: Those companies which produce, process or consume chemicals listed in Schedule 2 in annual amounts surpassing the thresholds established in the Convention must declare to their National Authority both the production facilities and the production volumes. Declared plant sites that comprise one or more plants which, during any of the previous three calendar years, have produced, processed or consumed Schedule 2 chemicals above inspection thresholds, or which are anticipated to produce, process or consume Schedule 2 chemicals above inspection thresholds in the next calendar year, are liable to inspections from the Technical Secretariat of the OPCW

Schedule 3 chemicals: The Convention also includes in this category production thresholds which, when surpassed, render declarable the facilities which produce them. In addition, declared facilities which produce Schedule 3 chemicals in excess of inspection thresholds are subject to random inspections.

The Convention also includes provisions for another group of chemicals which is of considerable importance to the chemical industry: the group of (unscheduled) 'discrete organic chemicals' (DOCs). These are understood to mean any chemical belonging to the class of chemical compounds consisting of all compounds of carbon which are identifiable by means of their chemical name, structural formula, if known, and by their Chemical Abstracts Service registry number if assigned.

In the case of such DOCs, production facilities must be declared whenever annual production surpasses 200 tonnes of all DOCs produced together. The exceptions are those facilities dedicated exclusively to the production of hydrocarbons or explosives, and the definition of DOCs itself makes an exception for all oxides, suphides and metal carbonates. The First Session of the Conference of States Parties to the Convention, which met in The Hague in May 1997, also agreed with the recommendations of the Preparatory Commission for the OPM, that polymers and oligomers of all compounds of carbon, are excluded from these declarations. Should these compounds contain phosphorus, sulphur or fluorine, the declaration threshold for each chemical will be 30 tonnes per year. The verification of these facilities will commence at the beginning of the fourth year after the entry into force of the Convention (entry into force was 29 April 1997), unless the Conference of the States Parties decides otherwise at its regular session in the third year after entry into force.

More information is available at OPCW's Web Site, URL: http://www.opcw.nl/ptshome.htm

International Organization for Chemical Sciences in Development

Programme Activities, 1998

For up-to-date Information about IOCD activities, please see the Web Site: www.iocd.unam.mx

(1) IOCD's vision and mission.

After reviewing 17 years of IOCD activities, from its creation in 1981 to the present, the IOCD's principal officers prepared the following vision and mission statements:

> *The IOCD Vision*: We envision IOCD as a global network of scientists committed to building capacity in the chemical sciences in developing countries and to employing this capacity in practical undertakings that contribute to the well-being of the people in these countries.
>
> *IOCD's mission* is to provide a vehicle for the ethical concerns of distinguished scientists wishing to assist their fellow chemical and biological scientists in developing nations, to utilize their resources and capacities in practical ways that will serve the needs of their communities, and to influence these scientists' career decisions based upon appropriate originality, entrepreneurialism and practicality.

(2) Activities of the IOCD Working Groups.

IOCD pursues its mission through four working groups, each focused on a specific field: *Plant Chemistry*, *Tropical Diseases*, *Environmental Analytical Chemistry*, and *Fertility Regulation*.

These working groups:

- organize symposia in developing countries that serve as catalysts for change by bringing together commercial, academic and basic scientific researchers to focus on practical solutions to developing world needs;
- provide opportunities for developing world scientists to work within world renowned laboratories, for short periods, in order to gain experience with modem methods and techniques;
- carry on workshops within developing world laboratories, in order to enhance proficiency in relevant techniques by providing hands-on research experience.

(a) Joint IOCD/IUPAC Working Group on Environmental Analytical Chemistry.

This working group convened the Workshop on Environmental Analytical Chemistry in Montevideo, Uruguay, from 19 to 22 March 1998 for between 20 and 30 analytical chemists in Latin American countries. The workshop took place in association with CHEMRAWN XI (Regional Conference on Environmental Chemistry for Latin America) that also convened in Montevideo from 15 to 21 March 1998. A description of the workshop (lecturers and topics) and CHEMRAWN may be requested from IOCD (see also p. 99 of this issue).

Funding of this workshop was made possible through grants from IUPAC and the Chemical Manufacturers Association (CMA), enabling the IOCD to cover the costs of air travel, hotel and meals of many of the participants. IOCD will also meet the cost of air travel and hotel and meals for several of the lecturers, although many have received support from their institutions or governments. IOCD also received a grant from UNESCO for reprinting of the 700-page Spanish language version of the EPA/FDA Central American Pesticide Laboratory Training Manual for distribution to analytical chemists in Latin America.

(b) IOCD Working Group on Plant Chemistry.

As a cosponsor with CYTED, a Latin American nongovernmental organization, IOCD organized the International Symposium on the Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americas on 23–26 February 1997 in Panama City, Panama. Over 200 participants from 29 countries gathered to hear updated information concerning different aspects of research on phytochemistry and pharmacology of plants in North and South America. Prior to the symposium, a workshop on chemical screening methods for plants was held in Lima, Peru for natural products chemists from Latin American countries. IOCD will publish the proceedings of the symposium as a book through Harwood Publishing Company within one year. (The proceedings of the previous international symposium organized by this working group in Zimbabwe in 1996 are available as a book: *Chemistry, Biological and Pharmacological Properties of African Medicinal Plants*. University of Zimbabwe Press, Harare, Zimbabwe. Price: US$50.00.)

Reviewing this book in the *Journal of Natural Products* (Vol. 60, no. 20, 1997), Dr Maurice Iwu of Walter Reed Army Institute of Research states that this book 'will remain a reference for a long time.'

Throughout 1998, the IOCD Working Group on Plant Chemistry will collaborate with other organizations in supporting symposia and workshops for natural products chemists in developing countries. With CYTED, IOCD is co-sponsoring the Workshop on Methodologies in the Search for New Lead Compounds from Plants (28 September—2 October 1998) in Santiago, Chile. IOCD expects to provide travel grants to three or four young chemists from Latin American countries as participants in the workshop.

At the 7th International Chemistry Conference in Africa (ICCA), 6–10 July 1998, in Durban, South Africa, IOCD is organizing a satellite symposium with two noted African research scientists, the President of IOCD, Dr Jean-Marie Lehn of Strasbourg and Paris, France, and the Chairman of the IOCD Plant Chemistry Working Group, Dr Kurt Hostettmann, Lausanne, Switzerland, who will review 10 years of research into African medicinal plants.

In a third collaboration in 1998, IOCD is co-sponsoring with ARRT International, Inc., publisher of the *Screening Forum*, the international conference CYPRUS 1998, on 'New Technologies and Frontiers in Drug Research,' 4–8 May 1998, in Limasol, Cyprus. The conference addresses emerging technologies in drug discovery with special attention to their impact on the chemical and biochemical sciences. ARRT International Inc. is meeting the full costs (registration fee and hotels and meals) for five scientists from developing countries (to be selected by IOCD) to participate in the conference. The complete programme of CYPRUS '98 is available from IOCD.

(c) IOCD Working Group on Tropical Diseases.

The Chairman of this working group, Dr Fred Opperdoes, Research Unit for Tropical Diseases, Brussels, Belgium, is also leader of COST-B9 'Action on Chemotherapy of Protozoal Infections.' COST is the acronym for the European Cooperation in Scientific and Technical Research, a programme of cooperative research among European universities that is funded by the European Union. At the request of Dr Opperdoes, the group of five European laboratories co-operating as COST-B9 have extended observer status to the IOCD Working Group on Tropical Diseases with the expectation that IOCD will facilitate participation of chemists from developing countries in COST programmes.

As the first collaborative activity between COST and IOCD, IOCD will convene a workshop on medicinal chemistry from 4 to 6 June 1998. This will follow the first COST-B9 Congress on Antiprotozoal Chemotherapy that meets 31 May to 3 June 1998, in Sierra Nevada, Granada (Spain). The medicinal chemistry workshop will help chemists from developing countries who are specialists in synthetic organic chemistry to acquire knowledge of the principles of contemporary medicinal chemistry and therefore become capable of moving from mere synthesis of an analogue of a lead compound that someone else has identified, to actual identification of that lead compound itself. A grant from the National Academy of Sciences and the American Chemical Society ensures that travel costs are covered so that chemists from developing countries may participate in this workshop. Instruction will be provided by both IOCD and COST scientists, including Dr Lester A. Mitscher, University of Kansas, a member of the Senior Advisory Council of IOCD and a Titular Member of the Commission on Training and Development, Chemistry and Human Health Division, IUPAC.

(3) IOCD support of biodiversity exploration and conservation.

In June 1994, IOCD responded to a request from the National Academy of Sciences to assist Dr Thomas Eisner of Cornell University in establishing a global organization for promoting exploration and conservation of biodiversity resources in developing countries. Dr Eisner is convinced that only a focused global effort can hope to stop the rapid disappearance of these critical resources under the continuing pressures of development. Under a grant from the MacArthur Foundation, IOCD obtained the services of Dr Charles Weiss, the former Science and Technology Adviser of the World Bank, to form the Biotic Exploration Fund as an instrument through which IOCD can collaborate with developing countries in building local scientific and entrepreneurial capacities needed for chemical and biological exploration of biodiversity, including eventually establishing production capacities for commercialization of findings from explorations.

South Africa. In early 1996, South Africa was the first country to request IOCD assistance through the Biotic Exploration Fund. IOCD used funds from the MacArthur Foundation grant and additional grants from UNESCO and the National Academy of Sciences to send Dr Weiss and another IOCD scientist to South Africa to work for six weeks with the South African Council for Scientific and Industrial Research (CSIR). This joint project preparation mission prepared a business plan for the CSIR that called for establishment of major commercial enterprises based on outcomes of exploration with biodiversity resources in South Africa.

Nepal. In 1997, the Royal Nepal Academy of Science and Technology requested IOCD to assist them in building local capacity for bioprospecting in Nepal. A grant from the Novartis Foundation for Sustainable Development enabled IOCD to respond to this request. In September 1997, IOCD scientist, Dr Maurice Iwu, traveled to Nepal to join members of the Nepal Traditional Medicine Promotion Group (TWPG) in a joint mission of several weeks.

While in Nepal, Dr Iwu and his colleagues:

1. conducted an initial workshop with the Traditional Medicine Promotion Group to explain the process of drug discovery and outline the operations and policies for bioprospecting;
2. visited relevant research laboratories and local private pharmaceutical, cosmetic and other manufacturing facilities based on biodiversity resources in Nepal;

3 interviewed government officials concerned with access to biodiversity resources, scientific research, and promotion of biotechnology business;
4 obtained information about traditional healers in order to learn about their resources and determine their capabilities;
5 discussed a specific local action that TWPG will implement. (IOCD has given a small grant to the TWPG for implementation of this local action and urged TMPG to recognize it must be a basic component of the long-term programme for developing the capacity and infrastructure in Nepal for bioprospecting).

Kenya. Also in 1997, the International Centre for Insect Physiology and Ecology (ICIPE) in Nairobi, Kenya, has requested IOCD assistance in preparing a bioprospecting programme focused on insect diversity. IOCD has allocated funds in a 1997 grant from the National Academy of Sciences and the American Chemical Society to the costs of a joint project preparation mission in Kenya for three weeks in June 1998.

In all its work through the Biotic Exploration Fund, IOCD is committed to dealing equitably and respectfully with indigenous peoples and to being guided by the following policy:

> IOCD intends to honour the letter and spirit of the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and other international, regional and national laws and policies concerning biodiversity.

Prepared by: Robert Maybury, Executive Director, IOCD, IOCD (USA Office), PO Box 8156, Falls Church, VA 22041 USA, Tel. & fax: (703) 845 9078, e-mail: iocd@igc.apc.org

Reports from IUPAC sponsored symposia

The Plenary and Invited Lectures from the IUPAC International Symposium on Advances in Polymer Science and Technology, appear in *Pure and Applied Chemistry* 1998, Vol. 70, 1229–1299

The Conference was organized by the Central Leather Research Institute, Madras from 5 to 9 January 1998.

One of the challenges confronting polymer chemists and technologists is to translate the recent insights of the structure and properties of macromolecules gained through research into the practicalities of the chemical industry. Macromolecules Science and Technology is unique in this aspect, in that innumerable developments in the field have found applications in industry as varied as consumer products, construction, packaging, electronics, coatings, space and aerospace, leather composites, etc.

The prestigious IUPAC International Symposium on Advances in Polymer Science and Technology, organized by the Central Leather Research Institute from 5 to 9 January 1998 at Chennai focused attention on the recent advances in the Indian and International scene of the last two decades. The Symposium covered 287 papers contributed by 590 scientists from India and abroad. The Symposium consisted of plenary, invited lectures and poster presentations, 127 papers were presented orally and 160 papers presented in the form of posters. The topics covered in the sessions were Polymerization by Single Site Catalysis, Novel Polymers and Polymerization Techniques, Liquid Crystalline Polymers, Conducting Polymers, Functional Polymers, Polymeric Membranes, Biomaterials and Biomedical Polymers, Polymeric Fibres, Blends and Composites, Polymer Structure–Property Relationships, Polymer Characterization and Newer Applications of Polymers.

This Symposium was cosponsored by the Indian National Science Academy, the Council of Scientific and Industrial Research, Departments of Science and Technology, Biotechnology and Defence Research Development Organization of the Government of India, Tamil Nadu State Council for Science and Technology, Indian Petrochemicals Corporation Ltd, Vadodara (India) and The Society for Polymer Science, India. The Conference organizers take this opportunity to thank the large number of International and Indian scientists who participated in this Symposium.

Dr K.S.V. Srinivasan,
Convenor

The Plenary and Invited Lectures of The Eighth International Conference on Bioinorganic Chemistry (ICBIC 8) appear in *Pure and Applied Chemistry* 1998, 70, 855–991

The Eighth International Conference on Bioinorganic Chemistry was held in Yokohama, Japan, during the week of 27 July–1 August 1997, with Prof. Masanobu Hidai, University of Tokyo, as Chairman. Following the tradition of the previous conferences held in Florence, Italy (1983), Algarve, Portugal (1985), Leiden, The Netherlands (1987), Cambridge, MA, USA (1989), Oxford, UK (1991), La Jolla, CA, USA (1993), and Lübeck, Germany (1995), the scientific programme of the Conference consisted of oral and poster sessions: there were five plenary lectures, 66 invited lectures, and 370 poster presentations, which were attended by 730 participants from 28 countries.

The plenary lectures were given by Profs R. Huber, K. D. Karlin, P.J. Sadler, J.K. Barton, and T. Kitagawa, and the 66 invited lectures were given in the following 18 sessions:

A Molybdenum
B Metal Uptake, Transport, and Storage
C Copper
D Heme Iron and Metalloporphyrins
E Metals in Medicine
F Nickel
G Manganese
H Zinc
I Bioinspired Homogeneous Catalysis
J Iron-Sulfur and Other Metal-Sulfur Clusters
K Activation of Small Molecules
L Metal Complexes of Small Biomolecules
M Non-Heme Iron
N Metals, Nucleic Acids, and Gene Regulation
O Environmental Bioinorganic Chemistry
P Vanadium
Q Electron and Energy Transfer
R Specific Application of Spectroscopy

All the lectures presented the state of the art of the current research activities in various fields of bioinorganic chemistry. The ICBIC 8 issue of *Pure and Applied Chemistry* contains the plenary lectures and invited lectures on selected topics. The first four lectures were presented by the plenary lecturers. They were followed by the lectures on molybdenum enzymes (A), galactose oxidase (C), heme enzymes (D), Mössbauer spectroscopy of iron porphyrins (D), water-oxidizing manganese enzyme models (G), metal–sulfur clusters (J), diiron complex-dioxygen interactions (M), orientation of imidazole rings in metal complexes (L), stacking and hydrolysis of nucleotide 5′-triphosphates (L), nucleobase arrangements by metal ion coordination (N), and electron transfer in metalloproteins (Q).

This issue will be a valuable guide and source of information for the current trends and achievements in bioinorganic chemistry. Owing to the page limitation, however, only a limited number of topics were selected, so that it was not possible to incorporate the other important and interesting lectures. Readers are recommended to refer to the abstracts of ICBIC 8 published in The *Journal of Inorganic Biochemistry* (Volume 67, Numbers 1–4, 1997) for further information.

The Conference was organized by the Science Council of Japan and the Chemical Society of Japan, and was sponsored by the International Union of Pure and Applied Chemistry, the Society of Biological Inorganic Chemistry, and the Division of Biofunctional Chemistry of the Chemical Society of Japan. Generous financial support by these and other sponsoring organizations and many companies is gratefully acknowledged. I also wish to thank all the members who took part in organizing the Conference for their heartfelt dedication.

Finally, I would like to express my sincere thanks to the lecturers for their kind cooperation and excellent contributions to this issue.

Osamu Yamauchi,
Conference Editor,
Chairman, Programme Committee

Commission of High Temperature Materials and Solid State Chemistry (II.3)

Summary of the minutes of the meeting in Geneva, 24–26 August 1997

The commission is working primarily on focused international projects concerned with inorganic materials. Current projects reflect the principal function of the Union, i.e. standardization and nomenclature. Other projects are concerned with advancement of teaching solid state chemistry, teaching materials chemistry, and chemistry related to problems of ceramic materials.

The activity of the commission in the area of standardization resulted in the report 'Characterization of SiC powders and influence of powder properties on sintering' by G. Schwier, J. Tensel and M.H. Lewis, published in *Pure and Applied Chemistry*. An important part of the report is the detailed description of the merits and shortcomings of methods for characterizing powder properties, such as particle size, morphology, bulk and surface chemistry.

The objectives of the project 'Characterization of carbonaceous materials and new carbons (CCMC)' are to collect and review the national standards and to point out differences in important parameters (e.g. sample size, particle size, temperature, etc.). The work is performed within the subcommittee project on CCMC. Dr Boehm reported that the various national standards for the characterization of carbon materials, ASTM, ISO, British Standards, DIN (Germany), AFNOR (France), NNI (Netherlands), JIS (Japan) are now compiled. Prof. Heintz (SUNY at Buffalo, NY) is in the process of listing these standards in a format suitable for easy comparison. The format will be similar to that used in an earlier publication in *Pure & Appl. Chem.* (1979). Prof. Heintz hopes to finish this work before the end of the year.

Several projects are devoted to terminology. The project 'Terminology for diffusion in solid state' is in its final stages. A draft manuscript has been prepared and sent to a number of external experts for comment. After revision in light of their comments, and approval by the commission, the revised manuscript will be sent to 15 referees.

The objective of the project 'Terminology of Vapour Deposition Techniques' is to provide definitions for terms used in vapour deposition science and technology. The coordinator proposed a list of terms and is soliciting comments from experts. This input will result in an extended and amended listing which will then be presented to the commission before sending to reviewers.

Provisional recommendations for silicon nitride terminology were accepted for publication in the *Journal of the European Ceramic Society* and announced in the *Bulletin of the American Ceramic Society*. Readers were invited to comment. The coordinator will prepare a revised report for IUPAC review after considering readers comments.

An important commission activity is to promote education in the fields of Solid State Chemistry and High Temperature Materials Chemistry. The purpose of the current project 'Teaching Experiments in Solid State Chemistry' is to widen the collection of instructive, easy-to-perform, tested laboratory experiments illustrating important aspects of solid state chemistry. A list of experiments with comments collected to date by the commission members will be made available to interested readers in the CTC newsletter, with plans to make them available on the World Wide Web.

Two current projects are devoted to ceramic materials 'Chemical research needed to improve High Temperature Processing of Advanced Ceramics' and 'Surface analysis of ceramics'. The purpose of the first project is to interest solid state chemists in devoting their knowledge and techniques to the solution of significant problems of modern technical ceramics, whereas the second project focuses on surface—sensitive experimental techniques directed toward ceramics. It is believed that both projects will be particularly useful to industrial users and processors of advanced ceramic materials. The basic approach in both projects is to engage a number of experts for recommendations and critical evaluation of the field.

The commission continued its highly successful series of conferences on High Temperature Materials Chemistry. HTMC IX was hosted by Prof. Spear at Pennsylvania State University in May 1997 and was attended by more than 130 participants. The plenary lectures were published in *Pure and Applied Chemistry* 1998, **70**, 439–515, and the conference proceedings, issued shortly after the conference, contain papers covering a broad spectrum of material phenomena at high temperatures. These conferences are greatly enhanced by the international composition and unique mix of expertise of the commission. HTMC X will be held at Jülich, Germany, in 2000, organized by Prof. Hilpert.

The commission discussed and verified several new potential projects, related in particular to contemporary inorganic materials. New members with expertise in the proposed projects were identified and proposed for membership in the commission.

Summary of the Minutes of the meeting of the Commission on Molecular Structure and Spectroscopy (I.5) at the IUPAC General Assembly, Geneva, Switzerland 24–27 August 1997

Fifteen members of the Commission on Molecular Structure and Spectroscopy (I.5), including national representatives and observers, met for three days of hard work during the 39th General Assembly in Geneva, Switzerland, with little time for admiring the beautiful setting on the Lac Leman and the famous Geneva fountain. Three new Titular Members, Robin S. McDowell, Noboru Hirota and James E. Boggs, and three Associate Members, Soji Tsuchiya, Qing-Shi Zhu and Paul von Rague Schleyer were elected to the Commission. Four new national Representatives were appointed, Profs P.T. Manoharan (India), J.P. Hawranek (Poland), B.J. Van der Veken (Belgium), and R. Janoschek (Austria).

Several projects were completed and the results published in *Pure & Appl. Chem.*: C.L. Wilkins, Guidelines on Nuclear Magnetic Resonance Computerized Databases *Pure & Appl. Chem.* 1995, **67**, 593; A.M. Bradshaw and N.V. Richardson, Symmetry, Selection Rules and Nomenclature in Surface Spectroscopy, *Pure & Appl. Chem.* 1996, **68**, 457; G. Guelachvili and 23 collaborators, High Resolution Wavenumber Standards for the Infrared, *Pure & Appl. Chem.* 1996, **68**, 193, and this paper was also reprinted in *J. Molec. Spectrosc.* 1996, **177**, 164 and *Spectrochim. Acta* 1996, **52**, 717; C.J.H. Schutte, J.E. Bertie, P.R. Bunker, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, Notations and Conventions in Molecular Spectroscopy part 1. General Spectroscopic Notation, *Pure & Appl. Chem.* 1997, **69**, 1633; C.J.H. Schutte, J.E. Bertie, P.R. Bunker, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, Notations and Conventions in Molecular Spectroscopy part 2. Symmetry Notation, *Pure & Appl. Chem.* 1997, **69**, 1641; P.R. Bunker, C.J.H. Schutte, J.T. Hougen, I.M. Mills, J.K.G. Watson and B.P. Winnewisser, Notations and Conventions in Molecular Spectroscopy part 3. Permutation and Permutation-Inversion Symmetry Notation, *Pure & Appl. Chem.* 1997, **69**, 1651.

The following book has been published: J.E. Bertie, C.D. Keefe and R.N. Jones, Tables of Intensities for the Calibration of Infrared Spectroscopic Measurements in the Liquid Phase, 263 pp., Blackwell Science Ltd, 1995. A joint article from Commissions I.5 and V.4 describing the work in the two commissions has been published in *Applied Spectroscopy* 1996, **50**, 12A: J.E. Bertie and T. Vo-Dinh, Spectroscopy Commissions of the International Union of Pure and Applied Chemistry.

Other articles which were in press or the projects were very close to completion were: R.K. Harris, J. Kowalewski and S. Cabral de Menezes, Parameters and Symbols for Use in Nuclear Magnetic Resonance, *Pure & Appl. Chem.* 1997, **69**, 2489–2505; E.D. Becker, W. Bremser, S. Cabral de Menezes, R. Goodfellow, P. Granger and R.K. Harris, Recommendations for NMR Nomenclature A. Nuclear Spin Properties and Conventions for Chemical Shifts; and J.E. Bertie, Specification of Components, Methods and Parameters in Fourier Transform Spectroscopy by Michelson and Related Interferometers. The latter paper has been divided into one part for modest resolution spectroscopy (0.1 cm^{-1} or less) and one for high resolution spectroscopy (10^{-3} cm^{-1} or better). In addition, a part pertaining to FT-Raman spectroscopy is included. The following manuscript of a book was approved in Geneva: E. Hirota, R.W. Field, J.P. Maier and S. Tsuchiya, Editors, Nonlinear Spectroscopy for Molecular Structure Determination. It constitutes a monograph of 268 pages and 10 chapters, probably suitable both for teaching and as a reference book to nonlinear spectroscopy. The book will be published by Blackwell early in 1998.

Projects from the Sub-Committee on Theoretical Chemistry are in progress: Guidelines for Presentation of Methodological Choices in the Publication of Computational Results, A. *Ab Initio* Electronic Structure Calculations (Project leader J.E. Boggs) *Pure & Appl. Chem.* 1998, **70**, 1015–1018. The paper was approved by the Commission for immediate publication. A draft for semi-empirical calculations is in progress (part B) and should be completed in two years. A third paper (part C) is planned to deal with computation of large molecules by molecular mechanics. An extensive report comprising 194 compounds was presented to the Commission for discussion and suggestion: R. Janoschek, The Quantum Chemical Computation of Structures and Properties of Small Experimentally Known Molecules I. Diatomic Molecules for H-Ar. It was agreed that the project would be completed following consultations with an international group of specialists.

Various new projects were initiated: Notations and Conventions in Molecular Spectroscopy. Part 4. Vibrational-Rotational Spectroscopy (Project leaders R.S. McDowell and J.K.G. Watson); Notations and Conventions in Molecular Spectroscopy. Part 5. Electronic-Vibrational-Rotational Spectroscopy (Project leaders J.K.G. Watson and R.S. McDowell). The Commission approved both these projects. Another proposed project was also approved: Quantities, Terminology and Symbols in Photothermal and Related Spectroscopies (Project leaders N. Hirota and M. Terazima); these methods are very sensitive and of increasing importance in applied science. R.K. Harris successfully sought approval-in-principle for a project to recommend Nomenclature for tensor quantities used in NMR, NQR and ESR Spectroscopies (Project leader R.K. Harris);

formal IUPAC approval for this project will be sought when the working party members have been recruited and the goals have been more precisely formulated.

Joint meetings were held between Commission I.5 and three other commissions: Commission V.4 (Commission on Spectrochemical and Other Optical Procedures for Analysis) of the Analytical Division; Commission I.3 (Commission on Electrochemistry) and Commission I.1 (Physicochemical Symbols, Terminology and Units). With each of these commissions various projects of common interests were discussed. These joint meetings are very important to avoid overlap between projects of different commissions and to provide stimulation for joint projects of greater breadth than is usually achieved by a single commission. In particular, the meetings in Geneva gave good ideas to both parties about new proposals and cooperation on existing projects. With Commission I.1 it was agreed on additions and alterations which should be included in the next edition of The Green Book (Quantities, Units and Symbols in Physical Chemistry).

Theoretical chemistry plays an ever increasing role in chemistry and the Subcommittee on Theoretical Chemistry, which was established at the General Assembly in Guildford, continues with its chairman Prof. James E. Boggs. The subcommittee is strengthened with five new members. The Subcommittee on Notations and Conventions for Molecular Spectroscopy has a new chairman Dr J.K.G. Watson, and Dr Robin S. McDowell and Prof. Jean-Marie Flaud will join the subcommittee.

The commission discussed the use of the World Wide Web and it was suggested that a Home Page be established. However, no decision was made concerning the content and who should be responsible for the Web Site.

The chairman, John E. Bertie, expressed his thanks to the outgoing members for their contributions to the work of Commission I.5 and looked forward seeing the members at the next IUPAC General Assembly to be held in Berlin in August 1999.

Peter Klaeboe
(Secretary of Commission I.5)

Book Review

This review was first published in *Terminology* 1997, 4(1), 161–189, and is reprinted in part by permission of the publisher, John Benjamins Publishing Co.

J.C. Rigg, S.S. Brown, R. Dybkaer and H. Olesen. *Compendium of Terminology and Nomenclature of properties in Clinical Laboratory Sciences (Recommendations 1995)*. Blackwell Science Ltd, 1995.

This volume, the *Silver Book*, prepared on behalf of the International Union of Pure and Applied Chemistry (IUPAC) and the International Federation of Clinical Chemistry (IFCC), is the first systematic and comprehensive guide to approved terminology and nomenclature for clinical chemistry and allied fields. The chief intent of the work is to harmonize and promulgate rules and conventions on quantities, dimensions and units.

Official recommendations published by IUPAC, IFCC, and other bodies, some of them not readily accessible to the scientific community, are here brought together and set forth in a unified format. The authors have exercised considerable editorial discretion in selecting material for inclusion and in coordinating recommendations from diverse sources. A voluminous bibliography supplies historical and authoritative underpinning.

This work is not just a bald catalogue of metrologic standards, but is a thorough treatment of the subject, including background information and definitions of terms pertaining to laboratory medicine, as well as valuable details on the history and philosophy of clinical laboratory metrology.

The marriage between laboratory science and practical medicine has never been altogether harmonious. Although workers in the two disciplines share essentially the same goals, they differ markedly in method and point of view. Medical interpretations and decisions tend to be far more qualitative, empirical and even subjective than those in pure science.

In view of the diversity of potential users, the *Silver Book* supplies definitions of terms and concepts in both pure science and clinical laboratory work. For the laboratory scientist, the authors provide an orientation to the clinical setting, with useful information about the processes whereby specimens are obtained, identified, and submitted for testing. The medical professional will discover that the goal of the work is not regimentation but international consistency and internal coherence in measurement.

Metrologic standards are prescribed for certain specialized fields (optical spectroscopy and spectrometry,

centrifugation, electrophoresis, and enzymology) having particular relevance to laboratory medicine. The *Silver Book* does not, however, pretend to be all-inclusive, much less definitive. Some branches of metrology have been passed over because a consensus on terminology and units has yet to be reached, others because they were not deemed sufficiently relevant to clinical laboratory work.

As the formal title of the book suggests, its recommendations are by no means limited to metrologic standards. Some narrow restrictions have also been placed on terminology. Terms such as activity, density, power and strength are rejected as ambiguous. Abbreviations are no longer acceptable for the names of chemical components, because some of these have more than one meaning, are not understood internationally or even across disciplines, or have been formed from obsolete terms. For example, TSH, universal shorthand for thyroid-stimulating hormone, is condemned because the latter term has supposedly been replaced by thyrotropin.

Although the *Silver Book* sets forth recommended standards, it does not undertake to persuade either laboratory workers or physicians and allied health practitioners to abandon deeply entrenched metrologic traditions, some of them rooted in the 19th century.

What kind of new units, standards and conventions are workers in laboratory medicine as well as physicians now asked to put into practice? A concrete example may help to clarify the type and extent of such changes.

Almost from the origins of modem clinical chemistry, concentrations have been recorded in units of weight (grams or submultiples of the gram) per standard volume (generally either one litre or one decalitre)—for instance, glucose: 124 mg/dL. By exception, ionic analytes such as sodium (Na^+) and bicarbonate (HCO_3^-) have in recent decades been reported in milliequivalents (mEq, based on molecular weight) to facilitate calculations of serum electrolyte balance.

Meeting the standards laid down in the *Silver Book* will require the following changes from current practice:

1. Concentrations (now called volume fractions) of most analytes must be reported in units based on molecular weight (now called relative molar mass) per unit volume. The only exceptions will be complex molecules or mixtures, for which a molar mass cannot be established; these will continue to be measured by weight. Applying the appropriate conversion factor to the glucose concentration given above, we get 0.688 mEq/dL.
2. The equivalent, or val, has been renamed the mole (mol). The glucose concentration thus becomes 0.688 mmol (millimoles)/dL.
3. Since the standard denominator, or volume unit, in a concentration is now one litre, our value for glucose must be restated as 6.88 mmol/L.
4. In line with Continental practice, the comma has replaced the decimal point: 6,88 mmol/L. (Using the comma to break up large figures into groups of three numerals—1,234,567,890—is no longer approved.)
5. A further change, though not yet required, appears extensively throughout the book and will no doubt become *de rigueur* in due course. This is the expression of an implied division, not with a slash mark, but by showing the denominator as a factor with a negative exponent: 6,88 mmol L^{-1}.

The first three of these changes have been put into effect by the publishers of a number of medical reference works and of some clinically oriented journals. But the 21st century will probably be well advanced before all these changes gain universal acceptance among clinical laboratory workers and physicians.

Even scientifically oriented workers may resist some of the innovations spelled out in the *Silver Book*. Everyone has trouble abandoning long-familiar language, units and symbols for new ones, but some of the standards proposed actually represent new ways of looking at physical reality. The language and perspective of systems-analysis theory is all-pervasive. The term constant is now restricted to 'universal constants of nature'. Hence, although molar number constant is approved as a new name for Avogadro's number, equilibrium constants are now expected to be termed equilibrium coefficients.

Among 'kinds-of-quantity of dimension one' (those in which exponents of dimensional terms are all zero), percentage and its symbol (%) are acceptable, but parts per million (p.p.m.) is not. Many old friends appear in unfamiliar guises. Density has become areic number, and specific gravity is now relative volumic mass. Specific heat has emerged from the furnace as massic kelvic enthalpy.

The language of this book is lean and rigorously precise. Even those who object to some of the recommendations as arbitrary or irrational must concede that the presentation of the material is clear and admirably coordinated. British-Continental spelling appears throughout: colour, litre, metre, titre; but: gram, kilogram.

Neither the *Silver Book* nor the recommendations of IUPAC, IFCC, and other bodies that it contains have any legislative force, unless they should be made mandatory by institutional or governmental authority. How fully the new standards will be voluntarily adopted, and by how large a segment of the scientific and medical world, remains to be seen.

John H. Dirckx,
University of Dayton

New books and publications

New IUPAC books

IUPAC Series on Analytical & Physical Chemistry of Environmental Systems. Series Editors: J. Buffle, University of Geneva, Geneva, Switzerland & H. van Leeuwen, Agricultural University, Wageningen, The Netherlands

The main purpose of this series is to make chemists and other scientists aware of the most important bio-physico-chemical processes which influence the behaviour of environmental systems, in terms of sound quantitative theoretical concepts. The volumes of this series emphasize processes which are specifically related to environmental systems, systems with which chemists with a main background in homogeneous reactions in solutions are often unfamiliar.

The main aim of this series is to discuss in detail:

(i) the important bio-physico-chemical processes and structures

(ii) the analytical tools which exist or should be developed to study these processes and structures

The interdisciplinary nature of the IUPAC Series ensures that these volumes are invaluable for chemists, biochemists, biologists, ecologists and environmental engineers.

Previously published volumes:

Environmental Particles, Vol.1, edited by J. Buffle & H.P. van Leeuwen. Lewis Publishers (1992), ISBN 0 87371 589 6.

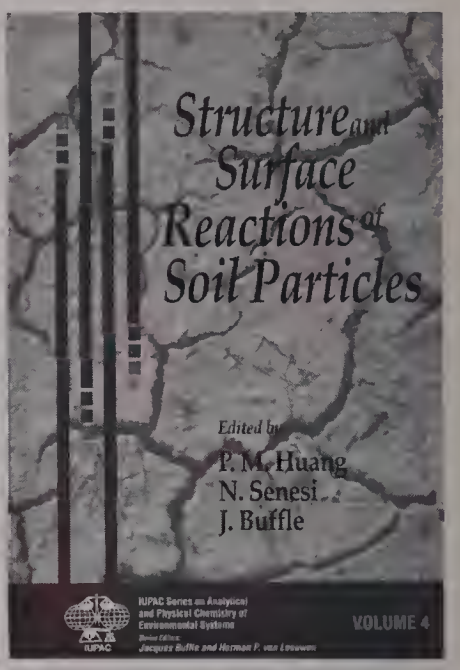
Environmental Particles, Vol.2, edited by J. Buffle & H.P. van Leeuwen. Lewis Publishers (1993), ISBN 0 87371 895 X.

Metal Speciation and Bioavailability in Aquatic Systems, Vol. 3, edited by A. Tessier & D.R. Turner. John Wiley & Sons (1996), ISBN 0 471 95830 1.

Structure and Surface Reactions of Soil Particles, Vol. 4, edited by P.M. Huang, N. Senesi & J. Buffle. John Wiley & Sons (1998), ISBN 0 471 95936 7.

A fundamental understanding of soil structures and processes at the molecular and microscopic level is essential to understanding and regulating the behaviour of environmental systems. *Structure & Surface Reactions of Soil Particles*, the definitive guide to the analysis of soil, addresses the basics of structure and surface reactions of soil particles and colloids.

Here, leading scientists review and evaluate the best sampling and analysis methods currently available, and summarize possible future research. Ideal for graduate students, chemists and biologists working in environmental analysis and soil chemists studying the effects of landfill, pesticides and climate change, this book specially covers:


Structure and Surface Reactions of Soil Particles
Edited by
P. M. Huang
N. Senesi
J. Buffle
IUPAC Series on Analytical and Physical Chemistry of Environmental Systems
VOLUME 4

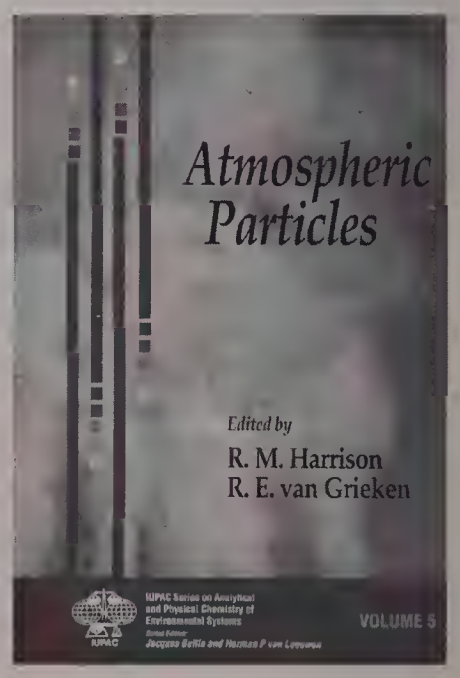
- Minerals-organics-microbes interactions in the soil environment.
- Fractal approach in the evaluation of soil particle dimensions.
- Aggregation and surface chemistry.
- Modern advanced instrumentation in analysis of soil particles.

Atmospheric Particles, Vol. 5, edited by R.M. Harrison & R. van Grieken. John Wiley & Sons (1998), ISBN 0 471 95935 9.

Devoted specifically to the chemistry of atmospheric particles which can impose environmental health impacts, for instance, by acting as catalysts in the air, speeding up processes such as global warming and ozone depletion.

After considering the sources and distribution of airborne particles, the authors then discuss sampling methods and methods of chemical analysis of individual aerosol types.

- First book to deal solely with airborne particles and their impact on climate, health and the atmosphere.
- Leading scientists review and evaluate the best methods available for analysis of atmospheric chemistry.
- Excellent overview of current research and forthcoming developments in this rapidly expanding area.



IOCD Working Group on Plant Chemistry. Second International Symposium on Chemistry, Biological and Pharmacological Properties of African Medicinal Plants. Addis Ababa, Ethiopia, 28 February–3 March 1999

The aim of the symposium is to bring together scientists from African and other countries who are involved in the phytochemical investigation of African plants of medicinal, agricultural, nutritional or toxicological interest. An update on different aspects of research concerning the phytochemistry and pharmacology of African plants will be presented. Participants from both academia and industry are invited to participate. The symposium will feature 12 plenary lectures, six from African speakers and 6 from non-African speakers. In addition, there will be contributed papers in the form of oral presentations and poster sessions.

Prior to the symposium, there will be a workshop on Analysis of Natural Products by Chemical and Biological Methods, University of Addis Ababa, 25–27 February 1999.

For further information, please contact: Prof. K. Hostettmann, Chairman, IOCD Working Group on Plant Chemistry., Institute of Pharmacognosy and Phytochemistry, University of Lausanne, B.E.P., CH-1015 Lausanne-Dongny, Switzerland, Tel. +41 21 692 45 61; Fax: +41 21 692 45 65; e-mail: kurt.hostettmann@ipp.uni.ch or *Prof. E. Dagne, Chemistry Department, University of Addis Ababa, PO Box 30270, Addis Ababa, Ethiopia., Tel.: +251 1 11 45 54 or 1 12 62 76; fax: +251 1 55 12 44; e-mail: eda@telecom.net.et*

International Dairy Federation Seminar On New Applications Of Membrane Technology. Rennes, France, 7–10 June 1999

Objectives

The Seminar will attempt to assemble the most recent information on new applications of the membrane processes that would benefit the dairy processing industry world-wide. The seminar is intended for dairy professionals interested in all aspects of membrane processes: researchers, industry practitioners, regulatory personnel, students, engineers and scientists interested in industrial membrane processes and new products development.

The overall objective of the seminar is to highlight new developments, new knowledge and new actual or proposed practical applications of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis for industrial processing of milk, traditional dairy products, novel dairy ingredients and dairy processing wastes.

The specific objectives of the five half-day sessions will be focused on

- the fluid milk industry, including milk and milkfat cream processing
- cheesemaking and whey processing
- fractionation of milk components and their derivatives
- engineering advances of membrane applications in the dairy industry

The Seminar is being organized within the context of the work objectives of IDF's Group B47 'Membrane Processing'.

Call for contributions

Programme contributions from participants are invited on any subject related to the above seminar objectives. Presentations will be either in oral form or eventually as posters. The Scientific Programme Committee reserves the right to accept or reject any paper and make the final decision on the form of presentation. The deadline for submission of titles accompanied by an abstract of about 200 words is 15 October 1998. Titles of a general nature, indications of the desire to submit a contribution, or titles submitted without the abstract, will not be considered. Information about acceptability of the proposals and detailed instructions for the authors regarding the presentation will be supplied at a later date to all authors of the proposed contributions.

Structure of the seminar

Monday, 7 June 1999 (afternoon):
Registration
Welcome and opening address
Cocktail reception

Tuesday, 8 June
Membrane applications in the fluid milk industry and for treatment of dairy wastes

Wednesday, 9 June
Membrane applications for cheesemaking and whey processing

Laboratory and dairy industry excursion
Seminar Dinner

Thursday, 10 June
Engineering advances and membrane applications in fractionation and recovery of milk and whey components and their fragments
Close 16.00

For further information on any aspects of this seminar, to mail your preliminary registrations and/or contribution proposals please contact: Prof. J.L. Maubois, Dairy Research Laboratory INRA, 65 Rue de Saint Brieuc, FR-35042 Rennes Cedex, France.

International Scientific Programme Committee: J.L. Maubois, Chairman, (France), G. Daufin (France), A. Garem (France), B. Horton (USA), P. Kelly (Ireland), P.Jelen (Canada), A. Marshall (New Zealand), K. Qvist (Denmark), G. Trädgård (Sweden), C. van der Horst (the Netherlands).

Local Organizing Committee: (INRA, Rennes, France): Mme D. Salvat-Brunaud (Chair), G. Ollivier, C. Hulin, A.M. Renouard, J. Fauquant, A. Garem, H. Goudédranche, G. Daufin, J.L. Maubois.

The XXVIth General Assembly of the International Union of Radio Science (URSI), University of Toronto, Toronto, Canada, 13–21 August 1999

The scientific programme will cover:

- Electromagnetic Metrology;
- Fields and Waves;
- Signals and Systems;
- Electronics and Photonics;
- Electromagnetic Noise and Interference;
- Wave Propagation and Remote Sensing;
- Ionospheric Radio and Propagation;
- Waves in Plasmas;
- Radio Astronomy;
- Electromagnetics in Biology and Medicine.

For further information, please contact: URSI GA '99 Secretariat, National Research Council Canada, Ottawa, Ontario, Canada KIA 0R6, Tel.: +1 613 993 7271; fax: +1 613 993 7250; e-mail: ursi99@nrc.ca, URL: http://www.nrc.ca/confserv/ursi99/welcome.html

Provisional Recommendations

IUPAC seeks your comments

In this section we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry* and synopses of these are published in *Chemistry International* as recent reports.

If you would like to comment on the provisional recommendations please write to your nearest national/regional centre requesting a copy of the full report. Copies are not available from the IUPAC Secretariat. The most recent list of the national/regional centres appeared in *Chemistry International* 1997, **17**, 141. This information is also available on the IUPAC Web Site: http://www.iupac.org

Inorganic Chemistry Division. Commission on Nomenclature of Inorganic Chemistry— Nomenclature of Organometallic Compounds of the Transition Elements

Organometallic compounds are defined as containing at least one bond between an organic molecule and a metal. Organometallic nomenclature therefore usually combines the nomenclature of organic chemistry and that of coordination chemistry. Provisional rules outlining nomenclature for such compounds are found both in Nomenclature of Organic Chemistry, 1979 and in Nomenclature of Inorganic Chemistry, 1990.

As part of a joint effort by commissions II.2 and III.1 to publish a separate rule book on organometallic nomenclature, a document on transition metal compounds is presented.

This document describes the nomenclature of compounds with metal–carbon single bonds, metal-carbon multiple bonds as well as complexes with unsaturated molecules (metal–π–complexes). Organometallic com-

pounds are considered to be produced by addition reactions and so they are named on an addition principle. The name therefore is built around the central metal atom name. Organic ligand names are derived according to the rules of organic chemistry with appropriate endings to indicate the different bonding modes. To designate the points of attachment of ligands in more complicated structures, the η, κ, and μ-notations are used. The final section deals with the abbreviated nomenclature for metallocenes and their derivatives.

Comments on these recommendations are welcome and should be sent by 1 December 1998 to Prof. Dr A. Salzer, Institut für Anorganische Chemie, RWTH Aachen, D 52056 Aachen, Germany. Tel.: +49 241 804646, fax: +49 241 8888 288, e-mail: albrecht.salzer@ac.rwth-aachen.de

Analytical Chemistry Division Commission on General Aspects of Analytical Chemistry. Classification and Use of Terms for Amplification and Related Reactions

(Prepared by D. Thorburn Burns[1] and Alan. Townshend[2])

[1]*Department of Analytical Chemistry, The Queen's University of Belfast, Belfast, BT9 5AG, N. Ireland, UK;* [2]*Department of Chemistry, The University of Hull, Hull, HU6 7RX, UK*

Synopsis: A systematic classification is given for the various types of amplification and related reactions. The report refines earlier IUPAC recommendations (*Pure & Appl. Chem.* 1982, **54**, 2553–2556,) to include non-multiplication reactions.

Comments by 1 December 1998 to Prof. D. Thornburn Burns <H.Johnston@Queens-Belfast.AC.UK>

Conference Calendar

Visit http://www.iupac.org for complete information and further links

1998

Medicinal Chemistry

6–10 September 1998
XVth International Symposium on Medicinal Chemistry, Edinburgh, Scotland, UK.
Dr J.F. Gibson, The Royal Society of Chemistry, Burlington House, London, W1V 0BN, UK. Tel.: +44 171 437 8656/440 3321, fax: +44 171 734 1227.

Electrochemistry

13–18 September 1998
49th Annual Meeting of the International Society of Electrochemistry, Kitakyushu, Japan.
Prof. Rika Hagiwara. Department of Fundamental Energy Science, Graduate School of Energy Science, Kyoto University, Sakyo-ku, Kyoto 606, Japan. Tel.: +81 75 753 5822, fax: +81 75 753 5906, e-mail: ise@g-chem.nucleng.kyoto-u.ac.jp

Chemistry of germanium, tin and lead

20–25 September 1998
9th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin & Lead (ICCOC GTL-9), Melbourne, Australia.
Prof. Dainis Dakternieks, School of Biological & Chemical Sciences, Deakin University, Geelong 3217, Australia. Tel.: +61 3 52 271318, fax: +61 3 52 271040, email: dainis@deakin.edu.au

Supramolecular science and technology

27 September–3 October 1998
1st International Conference on Supramolecular Science & Technology, Zakopane, Poland.
Prof. Marek Pietraszkiewicz, Chairman, Institute of Physical Chemistry, ul. Kaspazaka 44/52, 01-224 Warsaw, Poland. Tel.: +48 22 632 3221 (ext. 3226), fax: +48 39 12 0238, e-mail: pietrasz@ichf.edu.pl

Chemistry of natural products

11–16 October 1998
21st IUPAC symposium on the Chemistry of Natural Products, Beijing, China.
Prof. Xiaotian Liang, Chairman, Prof. Xibai Qiu, Secretary, c/o Chinese Chemical Society, PO Box 2709, Bejing 100080, China. Tel./fax: +86 10 625 68157, e-mail: qiuxb@infoc3.icas.ac.cn

Excitonic processes in condensed matter

2–5 November 1998
Third International Conference on Excitonic Processes in Condensed Matter, Boston, MA, USA.
Prof. William M. Yen, Department of Physics and Astronomy, University of Georgia, Athens, GA

30602-2451, USA. Tel.: +1 706 542 2491, fax: +1 706 542 2492, e-mail: wyen@hal.physast.uga.edu

Cuban Chemical Society

1-4 December 1998
III International Congress Cuban Chemical Society, Havana, Cuba.
Prof. Alberto J. Nunez Selles, Sociedad Cubana de Quimica, Ave 21 & 200, Atabey Apdo 16042, CP 11600 Havana, Cuba. Tel.: +537 218 178, fax: +537 336 471, e-mail: cqf@infomed.sld.cu

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes, Osaka, Japan.
Prof. Yasuhiko Shirota, Faculty of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan. Tel.: +81 6 879 7364, fax +81 6 877 7367, e-mail: isfd@chem.eng.osaka-u.ac.jp

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: +254 2 521003, fax: +254 2 520023, e-mail: p.sanchez@cgnet.com

Biodiversity and Bioresources

27 June–1 July 1999
2nd International Conference on Biodiversity and Bioresources—Conservation and Utilization, Belo Horizonte, Minas Gerais, Brazil.
Prof. Alaide Braga de Oliveira, Faculdade de Farmacia—UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte, Brazil. Fax: +55 31 337 9076, e-mail: fernao@dedalus.lcc.ufmg.br

Memorial K.I. Zamaraev

28 June–2 July 1999
International Memorial K.I. Zamaraev Conference on Physical Methods for Catalytic research at the Molecular Level, Novosibirsk, Russia.
Prof. V.N. Parmon, Boreskov Institute of Catalysis, 5, Prosp. Akad. Lavrentieva, Novosibirsk, 630090, Russia. Tel.: +7 3832 343269, fax: +7 3832 343056, e-mail: parmon@catalysis.nsk.su

Polymerization methods

12–15 July 1999
39th Microsymposium, Advances in Polymerization Methods: Controlled Synthesis of Functionalized Polymers, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Organo-metallic Chemistry

18–22 July 1999
10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10), Versailles, France.
Prof. J.P. Genet, Laboratoire de Synthese Selective Organique et Produits Naturels, E.N.S.C.P.—UMR CNRS 7573, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France. Tel.: +33 1 44 276743, fax: +33 1 44 071062, e-mail: genet@ext.jussieu.fr

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Kyoto University, Kyoto 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911, e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium (SAC 99), Dublin, Ireland.
Prof. Malcolm R. Smyth, Faculty of Science, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 704 5308, fax: +353 1 704 5503, e-mail: smythm@dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777,

fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

IUPAC General Assembly

6–13 August 1999
Frontiers in Chemistry: Molecular Basis of the Life Sciences, Berlin, Germany.
IUPAC Secretariat, Tel.: +1 919 485 8700, fax: +1 919 485 8706, e-mail: secretariat@iupac.org

IUPAC Congress

14–19 August 1999
Berlin, Germany.
Gesellschaft Deutscher Chemiker–GDCh, PO Box 90 04 40, 60444 Frankfurt Am Main, Germany. Tel.: +49 69 7917 358/360/366, Fax: +49 69 7917 475, e-mail: tg@gdch.de

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MMC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169-50, Japan. Tel.: +81 3 5286 3120, fax: +81 3 3209 5522, email: w169988@mn.waseda.ac.jp

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2000

Bio-organic chemistry

February 2000
5th IUPAC Symposium on Bio-Organic Chemistry (ISBOC-V), New Delhi, India.
Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 471 491 459, fax: +91 471 490 186.

High temperature materials chemistry

4–10 April 2000
10th International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), 52425 Jülich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Organic Synthesis

1–5 July 2000
13th International Conference on Organic Synthesis (ICOS-13), Warsaw, Poland.
Prof. M. Chmielewski, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, PO Box 58, Poland. Tel.: +48 22 631 8788, fax: +48 22 632 6681, e-mail: ichos@ichf.edu.pl

Macromolecules

9–14 July 2000
38th International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Prof. Stanislaw Penczek, Polish Academy of Sciences, ul. Sienkiewicza 112, 90363 Lodz, Poland. Tel.: +48 42 81 9815, fax: +48 42 684 7126, email: spenczek@bilbo.cbmm.lodz.pl

Polymers In Medicine

17–20 July 2000
40th Microsymposium Polymers In Medicine, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Science of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2360341, fax: +420 2367981, e-mail: sympo@imc.cas.cz

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on Chemical Thermodynamics, Halifax, Nova Scotia, Canada.
Dr Peter G. Kusalik, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia B3H 4J3, Canada. Tel.: +1 902 494 3627, Fax: +1 902 494 1310. e-mail: kusalik@is.dal.ca

Natural products

1 September 2000
22nd International Symposium on the Chemistry of Natural Products, Sao Paulo, Brazil.
Dr M. Fátima das G.F. da Silva, Universidade Federal de Sao Carlos, Depto. de Quimica, Via Washington Luiz, km 235, CP676, Sao Carlos, Brazil. Tel.: +55 16 274 8208, fax: +55 16 274 8350, e-mail: dmfs@power.ufscar.br

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV—c/o 11th IBS, Theodor-Heuss-Allee 25, 60486 Frankfurt/Main, Germany. Tel.: +49 69 7564 205, fax: +49 69 7564 201, e-mail: info@dechema.de

International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries
- to study topics of international importance to pure and applied chemistry which need standardization, or codification
- to co-operate with other international organizations which deal with topics of a chemical nature
- to contribute to the advancement and understanding of pure and applied chemistry in all its aspects

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

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Polska Akademia Nauk **(Poland)**
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Korean Chemical Society **(Republic of Korea)**
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Royal Society **(United Kingdom)**
National Research Council, National Academy of Sciences **(USA)**
Union of Yugoslav Chemical Societies

Chemistry International

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Blackwell
Science

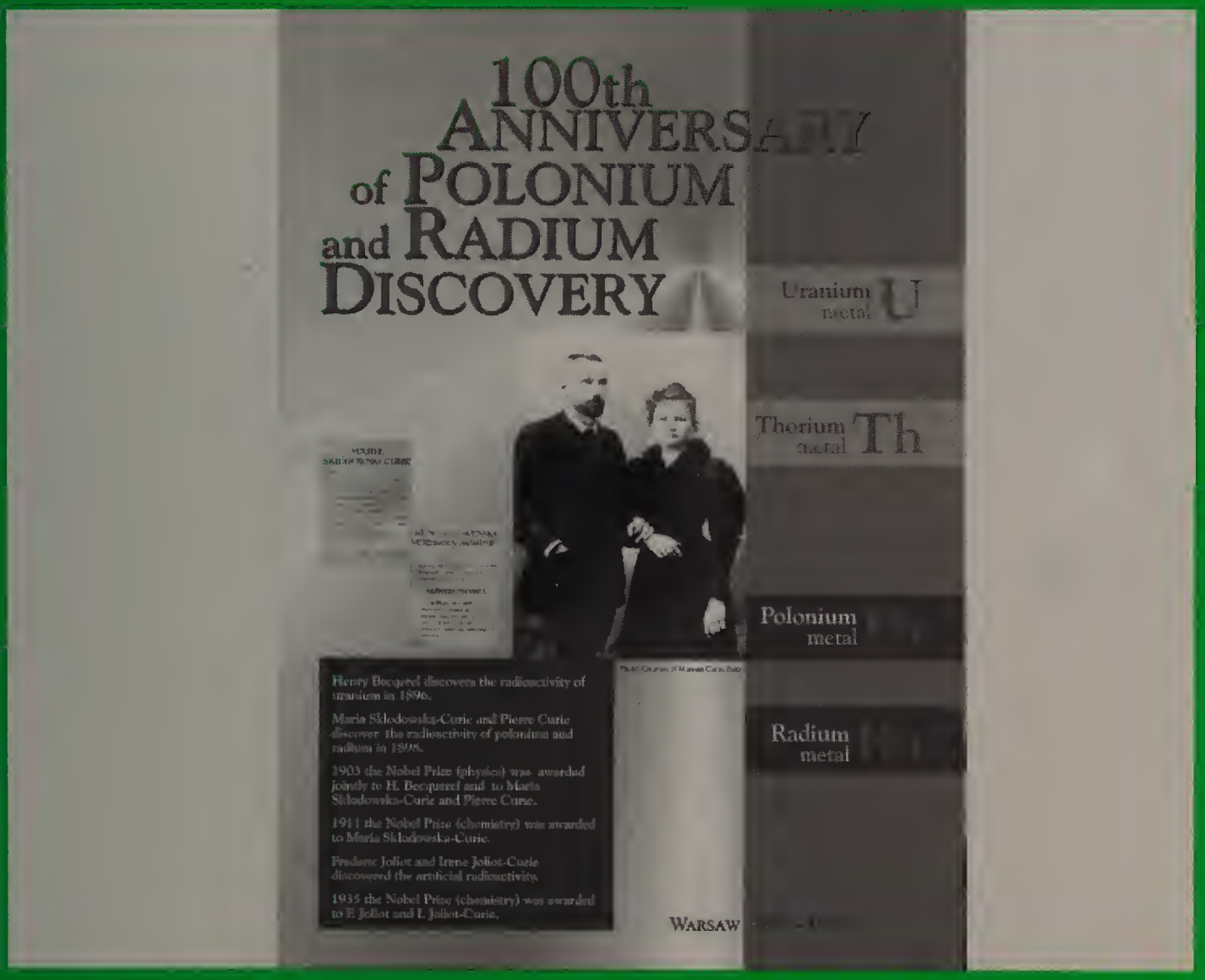
0193-6484(199807)20:4;1-Z

Printed in Great Britain by Alden, Oxford

ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)


100th ANNIVERSARY
of POLONIUM
and RADIUM
DISCOVERY
Uranium metal U
Thorium metal Th
Polonium metal
Radium metal
Henry Becquerel discovers the radioactivity of uranium in 1896.
Maria Sklodowska-Curie and Pierre Curie discover the radioactivity of polonium and radium in 1898.
1903 the Nobel Prize (physics) was awarded jointly to H. Becquerel and to Maria Sklodowska-Curie and Pierre Curie.
1911 the Nobel Prize (chemistry) was awarded to Maria Sklodowska-Curie.
Frederic Joliot and Irene Joliot-Curie discovered the artificial radioactivity.
1935 the Nobel Prize (chemistry) was awarded to F. Joliot and I. Joliot-Curie.
WARSAW

IUPAC

1998, Vol. 20, No. 5 (September)

Blackwell Science

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

PRODUCTION EDITOR: Howard Waller

All correspondence to be addressed to The Editor, Chemistry International, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Telephone: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org and http://www.iupac.org

Subscriptions

Six issues of *Chemistry International* will be published bimonthly in 1998 (one volume per annum) in January, March, May, July, September and November. The 1998 subscription rate including postage is GBP 75.00 (UK and overseas except North America) or USD 116.00 (US and Canada). The individual subscription rate is GBP 29.00 (UK and overseas except North America) or USD 42.00 (US and Canada). Microfiche subscriptions are available simultaneously with the printed edition, and microfilm at the end of the subscription year. Subscription orders may be placed directly with IUPAC's official publisher, Blackwell Science Ltd, PO Box 88, Oxford, UK; E-mail: journals.cs@blacksci.co.uk. Information on this journal can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

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Despatch. The news magazine is despatched within Europe by surface mail, to other continents by various forms of air-speeded delivery: to the US* by air freight for forwarding by periodicals post, to India by air freight for guaranteeed local delivery, and to all other countries by Accelerated Surface Post.

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*Periodicals postage paid at Rahway, NJ. Post Master, send address changes to *Chemistry International*, c/o Mercury Airfreight International Inc., 2323 Randolf Avenue, Avenel, NJ 07001, USA.

Front cover: Polish chemistry (see this issue, pages 131–138).

International Union of Pure and Applied Chemistry

Polish chemistry

Polish chemistry in the century of the discovery of polonium and radium by Maria Sklodowska-Curie and Pierre Curie

This is another in a continuing series of articles on chemistry in IUPC National Adhering Organizations

Historical

The beginnings of modern chemistry in Poland are connected with a great educational reform that was introduced by the Royal Commission of Education. That institution, which was founded in 1773, was in fact the first ministry of education in Europe. Under its auspices, the chairs of chemistry and natural history were established in 1782 at what was then known as Cracow University (now called Jagiellonian University). Jan Jaskiewicz (1749–1809), who was the first Professor of this chair, and his successor Franciszek Scheidt (1759–1807), introduced into their lectures the theories of Antoine Lavoisier. Jedrzej Sniadecki (1768–1838) became Professor of Chemistry at the University of Vilnius after completing his studies in Cracow, Pavia and Edinburgh, and in 1800 published the first Polish textbook of modern chemistry. This eminent scientist exerted a strong influence on the early stages of development of chemistry in Poland. At the present time, the Sniadecki medal is the highest distinction awarded by the Polish Chemical Society.

In 1795, Poland lost its independence for over 100 years, and the development of the experimental sciences was considerably hampered. The best situation in country was in the region that incorporated the Austro-Hungarian Monarchy, where the universities of Lvov and Cracow were able to continue their activities, and which was also where the Technical University at Lvov was organized. In 1883 in Cracow, Karol Olszewski (1846–1915) and Zygmunt Wroblewski (1845–1888) accomplished the first static liquefaction of nitrogen, oxygen and carbon monoxide. Olszewski became one of the founders of modern cryogenics. He also liquefied and solidified argon, and determined its critical properties. In about 1900, Wladyslaw Natanson (1864–1937) Professor of Theoretical Physics in Cracow, published a series of papers on the problems of thermodynamically irreversible processes, becoming a pioneer in the modern thermodynamics of irreversible processes. Marian Smoluchowski (1872–1917) Professor of Physics at Vienna, Lvov and Cracow universities developed the theory of fluctuations in gases and, independently of Einstein, proposed the theory of Brownian motion. Subsequent experimental confirmation of the Einstein–Smoluchowski equation became one of the final proofs in the kinetic theory of matter.

Great achievements in organic chemistry were made by Alfred Freund (1835–1892, first synthesis of cyclopropane, 1881), Bronislaw Radziszewski (1838–1931, Radziszewski's conversion of nitriles to amides with H_2O_2 in alkaline solution, 1890), Stanislaw Kostanecki (1860–1910, synthesis of flavonoids, 1899) and Stefan Niementowski (1866–1925, synthesis of 4-oxoquinazolines, 1895). In Cracow, Leon Marchlewski (1869–1946) was one of the founders in the field of chlorophyll chemistry. During the inter-war period (1918–1939), the study of organic chemistry developed at the chemistry departments of universities and technical universities. The particularly active centres were in Warsaw, Cracow and Lvov. From that period, the investigations performed by Tadeusz Milobêdzki (1873–1959, organophosphorus chemistry), Wiktor Lampe (1875–1962, curcumin and light-sensitive dyes), Karol Dziewonski (1876–1943, work on synthetic dyes, decacyclene and other polycyclic aromatics), R. Malachowski (1887–1944, carbonyl cyanide) and Edward Sucharda (1891–1947, chemistry of pyridine) deserve to be mentioned.

Among the Polish scientists who were working in Warsaw, two names deserve to be mentioned here: Jakub Natanson (1832–1884), who was the author of one of the earliest syntheses of artificial dyes (fuchsine), and Jozef Boguski (1853–1933), a pioneer in the field of chemical kinetics who also proposed the widely known equation which describes the kinetics of the dissolution of solids in liquids.

At the same time, many talented Poles had been working in different laboratories abroad. Marceli Nencki (1847–1901), who worked in Russia and Switzerland, was the author of some important publications in the field of organic chemistry and biochemistry. He greatly contributed to an establishment of the structure of heme, obtained hemine from hemoglobine, and studied the mechanisms of formation of urea in animal organisms. Stanislaw Kostanecki, who was also working in Switzerland, was renowned for his work on the structure and synthesis of flavonoids (Kostanecki synthesis). Bohdan Szyszkowski (1873–1931) published important papers on electrochemistry and surface chemistry.

Ignacy Moscicki (1867–1946), an outstanding specialist in chemical technology working in Switzerland, performed a technical synthesis of nitric acid from air.

Maria Sklodowska-Curie (1867–1934) and Kazimierz Fajans (1887–1975) are among the most famous Polish scientists who worked abroad, Mme Curie in France, and Fajans in Germany and then in the USA. There is no need to explain here their role in the development of modern chemistry and physics.

When Poland regained its independence in 1918, only just a few years of research and teaching had been organized at the old and new universities and technical universities. In fact, in the inter-war period, all the main branches of chemistry research had their representatives at Polish universities and laboratories. In inorganic chemistry Wiktor Jakob (1886–1971) and Boguslawa Jezowska-Trzebiatowska (1908–1991) had been working on the coordination chemistry of transition metals and the chemistry of rhenium. Wlodzimierz Trzebiatowski (1906–1982) began his work on the magnetic properties of alloys and intermetallic compounds. Alfons Krause (1895–1972) carried out studies on the structure and properties of amphoteric hydroxides and oxides, in particular of iron.

Important research was carried out in the field of organic chemistry. Osman Achmatowicz (1899–1988) was an eminent specialist in the chemistry of alkaloids and terpenes. Synthetic dyes were investigated by Waclaw Lesnianski (1886–1956) and natural dyes by Wiktor Lampe. Polycyclic aromatic hydrocarbons and alkaloids were the object of research carried out by Jerzy Suszko (1889–1972). Tadeusz Urbanski (1901–1985) had begun his work on nitrocompounds and explosives.

The field of Physical chemistry was represented by many investigators. Among the most notable were: Wojciech Swietoslawski (1881–1968) an international authority in the field of thermochemistry, ebuliometry and polyazeotropy. Antoni Galecki (1882–1962, chemistry of colloids), Mieczyslaw Centnerszwer (1874–1944, chemical kinetics, multiphase equilibria electrochemistry of fused salts), Alicja Dorabialska (1897–1975) a specialist in microcalorimetry who studied the heat of radiation of radioisotopes, allotropic transformations and corrosion of metals, Bogdan Kamienski (1897–1973, surface chemistry, flotation of minerals), Wiktor Kemula (1902–1985, electrochemistry, polarography), Antoni Basinski (1905–1990 colloids, polymers and chemical kinetics) and Jan Zawidzki (1866–1928, chemical kinetics). The physicochemical fundamentals of chemical technology were studied by Jozef Zawadzki (1886–1951, technology of sulfuric acid and Portland cement, thermal decomposition of solids). New methods of petroleum technology were developed by Stanislaw Pilat (1881–1941).

Zygmunt A. Klemensiewicz (1886–1963) working in the Fritz Haber laboratory in Karlsruhe, laid the foundations for membrane electrodes in potentiometry. After the First World War, several centres were created which carried out both research and practical applications of classical and technical analytical methods. The names of Tadeusz Milobêdzki and Marceli Struszynski (1880–1959) of the Technical University of Warsaw should be mentioned here.

All this highly successful development was suddenly interrupted by the outbreak of the Second World War in 1939, which resulted in great disruption to the whole country. After the war, those scientists who survived contributed to a reconstruction of the system of higher education in Poland. In the years 1945–1955, new centres of research in chemistry had been established. Besides the chemistry departments of the universities (Warsaw, Wroclaw, Lodz, Cracow, Gdansk, Poznan Torun, Lublin, Bialystok, Katowice, Opole) and the technical universities (Warsaw, Wroclaw, Lodz, Gdansk, Gliwice, Szczecin, Rzeszow, Lublin, Poznan), research institutes of the Polish Academy of Sciences (established 1951) were also created.

Inorganic chemistry and related fields

Coordination chemistry is one of the best developed fields of inorganic chemistry. Research in this direction is being carried out in Wroclaw, Cracow, Poznan and Torun, and also in several smaller scientific centres elsewhere. The synthesis, structure and physicochemical properties of transition metal complexes using different ligands are being studied, including ligands of biological importance such as amino acids and nucleotides, forming models of metal-centred biological systems. Chemical and thermal stability, spectroscopic and magnetic properties, and the chemical and the photochemical reactivities of these complexes are also under investigation. Homogeneous catalysis, closely related to structural coordination chemistry, is represented in Poland in several centres which are specialising in inorganic (Wroclaw, Poznan, Cracow), organic (Warsaw) and physical (Warsaw, Cracow) chemistry.

Separation of lanthanides, their coordination and structural chemistry, spectroscopy and chemiluminescence are being studied in Lublin, Wroclaw, Lodz and Poznan.

Silicate chemistry is centred on the synthesis of old and new generations of zeolites, pillared clays (Cracow) and structure, as well as the properties of glass (Cracow, Gdansk).

Different aspects of solid state chemistry are under study in Poland. The physicochemical properties of simple and mixed oxides of transition metals are the object of investigations connected with heterogeneous catalys-

sis, the high temperature corrosion of metals, and materials engineering (Cracow). Defect structure and equilibria, diffusion, electrical conductivity, and the magnetic properties of transition metal oxides, as well as the segregation in solid solutions and reactions in solid state also being investigated.

Equilibria and binary and ternary diagrams of transition metal oxides are under study in Szczecin and Cracow, and those of alkaline earth phosphates in Wroclaw. Investigations into the synthesis and structure of mixed oxide systems, important from the point of view of high temperature superconductivity, have been undertaken.

Physical and structural chemistry studies on solids are being carried out in Wroclaw, where the crystal structure and magnetic properties of uranium compounds, intermetallic compounds, ferroelectrics and other solids are being investigated.

The synthesis and study of physical properties of nitrides, metal hydrides, intercalated chalcogenides and fullerenes are being carried out in several laboratories.

Physical chemistry and related fields

Theoretical chemistry was founded in Poland at Cracow in the 1950s under the leadership of Kazimierz Guminski (1908–1983), and at the Jagiellonian University, and also in Warsaw under Wlodzimierz Kolos (1928–1996). Both centres very quickly gained an international reputation, the Cracow centre for its studies of the electronic structure of π-electron molecules and transition metal complexes, as well as molecular vibrations; the Warsaw group in very accurate calculations of the electronic structure of small molecules (Kolos and his student Lutoslaw Wolniewicz, Torun). Meanwhile, other centres began research in theoretical chemistry (Torun, Wroclaw, Poznan) as well in as smaller places (Lublin, Katowice, Lodz) and other scientific pioneers appeared (who were often the students of the above-mentioned founders). The results of the joint efforts often represented the state of the art in the following areas: the modern theory of intermolecular interactions and molecular properties, the most accurate calculations for small systems, including a determination of the mass of the neutrino, muon-catalysed fusion, electronic correlation in atoms and molecular vibrations, efficient algorithms for protein structure prediction, global optimization algorithms and the development of efficient methods in density function theory, etc.

Studies on the application of correlation analysis in organic chemistry (solvent and substituent effects on physico-chemical properties) should also be noted (Warsaw, Poznan, Cracow). Some contribution to the theory of aromaticity (Warsaw) should also to be mentioned here.

Equilibrium and nonequilibrium thermodynamics, as well as thermochemistry have been developed in Warsaw, Cracow, Lodz, Gdansk and Wroclaw. These relate, among others, to diffusion in liquids, the theory of charge transport in metals, diffusion in adsorbed layers, the thermodynamics of associated liquids, and physical chemistry studies of metal hydrides under high pressure. This embraces both the synthesis of various hydrides and determinations of the thermodynamic characteristics of systems under high pressure. The results concerning the thermodynamics of solutions and fused salts which were obtained by means of electrochemical methods (ionic equilibria and acid–base interactions) should also be mentioned here.

The discovery of the hanging mercury drop electrode, stripping voltammetry and chromatopolarography (the first amperometric detectors for liquid chromatography) were made in the school of electrochemical studies founded by Wiktor Kemula in Warsaw. Electrochemical investigations have also been carried out in Lodz, Wroclaw, Poznañ, Cracow and Gdansk in the field of the structure of electrolyte solutions, including nonaqeous solutions and fused salts, both inorganic and organic, the structure of double layers, the kinetics and mechanism of electrode processes, corrosion, electrochemical sources of energy, modified electrodes (polymeric electrodes in particular), organic electrosynthesis and electroanalysis, as well as in the exploration of fused carbonate fuel cells and a recognition of the kinetics and mechanisms of electrode processes in the electrolysis of aluminium and magnesium. Polish physicochemists have a long and well-established tradition in the study of interfaces. A number of institutes at the universities and in the Polish Academy of Sciences have been founded (in Cracow, Warsaw, Wroclaw, Gliwice, Poznan and Lodz). At the same time, five applied chemistry research institutes and four industrial laboratories have been organized (Warsaw, Kedzierzyn-Kozle, Pulawy and Cracow). Fundamental and applied research has been developed which led to the industrial application of new catalytic processes. Amongst other subjects, the selective oxidation of hydrocarbons, the synthesis of sulphuric acid, synthesis of ammonia, hydrogenation, processes of refining, chemistry of zeolites catalysts, combustion of pollutants are being studied. Investigations into the applications of quantum chemical methods in catalysis have also been carried out. Novel efficient catalysts were developed for industry.

Research into surface and colloid chemistry is being carried out in Cracow, Lublin, Wroclaw, Poznan and Lodz. The main achievements in this area are related to the development of the convective diffusion theory of colloid transport, the formulation of a new localized adsorption model for a description of the kinetics of ad-

sorption of macro molecules, development of a unified theoretical description of adsorption, description of the electrokinetic phenomena in disperse systems and the synthesis of a new class of biodegradable nonionic surfactants (dioxanes).

The rapid development of physicochemical studies in material science (Wroclaw, Warsaw, Poznan, Lodz and Gliwice) should also to be mentioned here. This relates both to the search for new materials and studies on their physical properties important in practice. One should also mention here the results of investigations into the electrical and optical properties of molecular crystals and composite materials, novel photoactive materials, the recording of optical information, the spectroscopy of highly conducting organic materials and nonlinear optical properties. Results obtained from research on reticular doped polymers and plasmic polymers should also be mentioned here. In Warsaw, novel liquid crystalline materials were elaborated and applied in practice. A rich family of ferroelectric crystals were discovered which were based on halogenoantimonates and bismuthates, and important results were obtained in the field of magnetic materials (Wroclaw). This field embraces among other things semiconducting magnetics (Warsaw), permanent magnets based on rare-earth compounds, thin magnetic films (Poznan), and magnetic properties of a variety of uranium compounds which appeared to be interesting from the physical point of view (spectacular ferromagnetic properties of β-UH_3; Wroclaw). A contribution to the investigations into various types of intermetallic rare-earth compounds (Wroclaw, Cracow and Katowice) and magnetic nanomaterials (Warsaw and Poznan) should also be emphasized. Recently, a number of new molecular ferro- and antiferromagentic materials were synthesized and explored with respect to their physical properties and low temperature magnetism (Wroclaw).

In structural studies, a special position is occupied by the hydrogen bond research which is being carried out in Wroclaw, Poznan, Warsaw, Cracow, Lodz, Gdansk and Szczecin. This relates to the theory of vibrational spectra, infrared continua, polarized transmission spectra, isotope effects, charge distributions and proton transfer in hydrogen bonded molecules, and numerical band shape analysis and dynamics of hydrogen bonded systems. Special attention is being paid to the strongest quasi-symmetric bridges such as those in protonated proton sponges. Resonance methods, namely NMR (Warsaw, Cracow, Poznan—structural application of nitrogen magnetic resonance, dynamic aspects, both theoretical and experimental) and ESR and NQR (Poznan, Wroclaw—application to hydrogen bonded solids in particular) have been developed.

A rapid development of almost all branches of crystallographic studies began in the 1970s. This relates to structural studies on such systems as intermetallic alloys, metaloorganic and complex compounds, organic and biologically active compounds (including proteins). The results that were obtained in studies of disordered structures, phase transitions, liquid crystals and hydrogen-bonded systems should be mentioned here. These achievements were made possible due to, among others things, the development of modern facilities (e.g. the KUMA automatic four circle diffractometer with CCD detector).

In the field of radiation chemistry which was developed in Lodz, Warsaw, Wroclaw and Siedlce, results were obtained concerning the description of excited states and migration processes in irradiated materials, including quantum mechanical electron tunneling, low temperature pulse radiolysis, the radiation chemistry of polymers and free radicals, computer simulations of radiation and modelling of the solvated electron.

During the inter-war period, three important names in the field of photochemistry and photophysics should be mentioned: Wiktor Kemula, and the physicists Stefan Pienkowski (1883–1953) and Aleksander Jablonski (1898–1980). At Warsaw University, Pienkowski set up a well-known school of photoluminescence studies where a number of significant discoveries were made: independence of luminescence spectra of excitation energy, the concept of the fluorescence centre, an exploration of the anisotropy of adsorbed molecules and above all, both the discovery of the metastable excited state and the publication by A. Jablonski of a subsequently well known energetic diagram which described spectra and photoluminescence kinetics.

In Gdansk, a solvatochromic method of dipole moment determination in excited state was elaborated, in Warsaw donor-acceptor (CT) complexes in gas phase and the kinetic rules of photophysics of CT complexes were discovered. The presence of twisted conformations in the excited state (TICT states) was explained for molecules containing electron donor and acceptor fragments. The existence of such states was confirmed in a number of experiments. In other studies, direct excitation to the triplet state in the presence of heavy atoms or paramagnetic compounds was demonstrated. The phenomenon of photoinduced double proton transfer was discovered. In Cracow, the theory of electron transfer and the kinetics of elementary photophysical processes was extended. In Poznan, studies of photochemical reactions for biologically important molecules are being carried out. In Wroclaw, B. Jezowska-Trzebiatowska initiated intense studies on the spectroscopy and luminescence of coordination compounds. Among other things, several new laser-active materials based on lanthanide compounds were discovered. The recent contribution of Polish physico-chemists to the spectroscopy of single molecules, arising from close international cooperation, should also be noted.

Organic chemistry

Early research maintained links to the pre-war studies. Jerzy Suszko (1895–1972, Poznan: quinine alkaloids), Osman Achmatowicz (1899–1988, Lodz, later Warsaw: strychnine, Lycopodium alkaloids), and Zofia Jerzmanowska (Lodz, flavanoids) were all involved in the isolation and structure of natural products, Edwin Plazek (Wroclaw) was involved in the chemistry of pyridine and Tadeusz Urbanski (Warsaw) developed the chemistry of nitrocompounds and explosives. New researchers gradually took the lead: Jan Michalski (Lodz) extensively developed the chemistry of organo-phosphorus compounds, Henryk Kuczynski (1909–1991, Wroclaw) and Witold Zacharewicz (Torun) led the foundation of terpenoid chemistry and Maciej Wiewiorowski (Poznan) developed the field of lupin alkaloids.

The next generation, currently active, has broadened further the fields of research. This has been connected to the rising interest in scientific investigations in general and with the growing availability of new instrumentation. In addition this has also been connected with an expansion in international cooperation. As a result, new ideas and new subjects have been developed.

What are the main lines of organic chemistry research in Poland now?

New methods of organic chemistry: nucleophilic substitution in aromatic nitro compounds (Warsaw), two-phase reactions (Warsaw), oxidation of organic compounds (Wroclaw), and new stereoselective syntheses (Warsaw, Lodz and Wroclaw). The chemistry of natural products: isoprenoids (Warsaw, Bialystok), carbohydrates (Warsaw, Gdansk) amino acids, peptides (Wroclaw, Gdansk, Warsaw, and Opole), alkaloids (Warsaw, Poznan), antibiotics (Gdansk), porphyrins (Wroclaw). Nucleic acids (Poznan), nucleotides (Lodz), organo-phosphorus and -sulfur chemistry (Lodz, Wroclaw and Lublin), organoboron chemistry (Torun), organosilicon chemistry (Lodz, Poznan and Gdansk), chemistry of heterocycles (Gliwice, Lodz and Cracow), supramolecular chemistry (Warsaw). High pressure methods are studied in the synthesis of organic compounds (Warsaw).

Two large projects are underway in Warsaw: reactions in catalytic two-phase systems and 'vicarious nucleophilic substitution' have been carried out. The chemistry of the thioacids of phosphorus (thiopyrophosphates, substitution reactions of thiophosphates) was developed in Lodz, where substantial contributions have been made to the chemistry of phosphorus(III) compounds and to optically active sulfur(IV) acids. Organic syntheses based on amino acid-derived aldehydes were expanded upon in Warsaw. New oxidation methods of aromatic compounds have been introduced in Wroclaw. New syntheses of amines based on phosphoamidites were studied in Lodz. The structures and syntheses of the first sulfur atom-containing alkaloids were studied in Warsaw. The structures of several complex polyene macrolide antibiotics (Gdansk) have been disclosed. Several significant results have also been achieved in the synthesis of natural products: new approaches to marine sterols and vitamin D-type compounds (Warsaw), new porphyrins (Wroclaw), two general (*de novo*) approaches to monosaccharides (Warsaw), and β-lactam synthesis (Warsaw). In nucleoside chemistry, the contributions of Lódz (chemistry of nucleoside esters with phosphorus thioacids, synthesis of enantiomeric phosphoric acid containing isotopes of oxygen) and Poznan (Markiewicz's reagent in nucleoside chemistry) should be mentioned.

Analytical chemistry

The reconstruction of educational institutions and industry after the Second World War promoted the development of modern analytical techniques. Wiktor Kemula (Warsaw), developed different variants of voltammetry, in particular pioneering work on chromatopolarography (1953), and anodic stripping voltammetry (1958). Janina Swietoslawska (Warsaw) introduced mathematical methods into spectrophotometry (1952), long before the importance of chemometry was recognized. Bogdan Kaminski (Cracow), Janina Opienska-Blauth (1895–1987) and Andrzej Waksmundzki (Lublin) created a basis for the further development of chromatography. Jerzy Minczewski (1914–1995) (Warsaw) introduced modern approaches to inorganic trace analysis. Zygmunt Marczenko (Warsaw) developed the application of organic reagents for the separation and spectrophotometric determination of metals and metalloids. All of these scientists have created scientific schools that are still active and are well recognized abroad.

The development of analytical chemistry exerted a considerable influence on research topics in Poland. In chemical techniques, research on organic reagents continues, including derivative spectrophotometry and separation by flotation and multicomponent complexes in spectrophotometry (Warsaw). The original technique of thiomercurometry was developed by M. Wronski (1926–1996) (Lodz). The iodine–azide reaction was applied in many methods which are of theoretical and practical significance (Poznan).

Significant achievements were noted in stripping voltammetry, the application of ultramicroelectrodes, ion-selective electrodes (Warsaw, Poznan and Lublin). New electrochemical instrumentation was developed (Cracow). Biosensors based on electrochemical detec-

tion have been developed (Warsaw).

Thin-layer chromatography, both gradient and pressured techniques, was developed (Lublin, Warsaw and Katowice). In HPLC, various stationary phases were investigated (Lublin). Fundamental theoretical studies on the relationship between retention data and the molecular structure of the chromatographed substances are being carried out (Gdansk, Torun and Lublin). Novel results have been obtained in trace analysis using ion-exchange chromatography with a theoretical approach to resolution, as well as in the modification of anion exchangers with sulphonated organic reagents (Warsaw). Students of Edmund Kozlowski (1932–1995, Gdansk), where head space analysis was studied, have been carrying out extensive investigations on the determination of organic pollutants in the environment, in particular on sampling and sample treatment. Liquid crystals were applied as stationary phases (Warsaw). New types of detectors have been developed (Cracow).

Atomic spectroscopy has been intensively applied to trace analysis (Warsaw). Particular achievements were associated with the study of interference effects and with correcting them by methods of standard addition and subsequent dilution, as well as with the application of chemical modifiers to atomic absorption spectrometry. Research on the use of microwaves in analytical spectrometry is also ongoing (Poznan). Spectroscopic techniques are being also applied to the study of metal speciation (Warsaw and Poznan).

Flow methods, with various detection methods and on line sample pretreatment methods are being developed for speciation, environmental and clinical analysis (Warsaw). Chemical sensors, including potentiometric, amperometric, piezoelectric, ISFETs and semiconductors are being developed for various methods of routine chemical analysis (Warsaw). Numerous chemometric methods have been developed for structural analysis, multicomponent analytical procedures, the optimization of analytical procedures and for data processing (Cracow, Rzeszow). The environmental monitoring of air and water pollution is being developed and carried out (Warsaw, Poznan). Research has been initiated into cooperation with the Environmental Specimen Bank (Warsaw). Several certified reference materials have been developed on the basis of international interlaboratory studies (Warsaw, Cracow).

Polymer chemistry and technology

Polymer chemistry and polymer technology in Poland have their roots in the early 1930s, when the basic research on polyaromatic compounds (Wojciech Swietoslawski and Dyonizy Smolenski) and applied research on plastic and rubber technology was developed. This area includes the original technology for synthetic rubber production (KER) which was later transferred to the USA.

After World War II, a number of centres for polymer science emerged. In Lodz, the physical chemistry of synthetic fibres was developed (Antoni Boryniec, Eligia Turska) as well as the chemistry of polyamides and polysiloxanes (Stanislaw Chrzczonowicz, Zygmunt Lasocki). Ion-exchange resins were studied in Wroclaw (Tadeusz Rabek, J. Lindeman), whereas the Warsaw Technical University group (S. Porejko) concentrated on polymer synthesis. In the University of Torun (Antoni Basinski), research in the area of the physical chemistry of polymers and colloids was carried out. In the early 1950s the Institute of Plastics was created (M. Wajnryb, J. Pochwalski), which later became a part of the Industrial Chemistry Research Institute. In the latter, several new technologies were developed, including an original process for polyacetal polymer production.

Lodz remains the major centre for polymer chemistry and technology in Poland with its Center of Molecular and Macromolecular Studies of the Polish Academy of Science, Institutes in Lodz Technical University and several industrial laboratories. These groups cover a broad range of research fields, including theories of ionic ring-opening polymerization, the electric properties of polymers, and elastomer properties. In the Warsaw Institute of Technology, polymerization with metaloorganic catalysis and solid polymer electrolytes are being studied. The theory of fibre formation has been formulated by a group from the Polish Academy of Science Institute. In Gliwice, Szczecin, Wroclaw and Zabrze, degradable and biomedical polymers are under study, while in Opole, olefin polymerization is being investigated. Applied research in the area of polymer technology is being carried out, not only in the Industrial Chemistry Research Institute in Warsaw, but also in a number of industrial laboratories, namely in Plock, Osiecim, Blachownia and Tarnow.

Chemical technology

The Polish chemical industry has a long history, dating back to the beginning of the 19th century. Parallel to its formation and growth was the development of chemical technology—a science which studies the processes and the products. Many outstanding Polish scientists have made significant contributions to its progress.

Initially, the chemical industry in this region was based exclusively on local raw materials, such as the rock salt used for fabrication of soda, the sulfur for powder and sulphuric acid productions, pyrite for sulphuric acid production, etc. The beginning of the exploitation of the crude oil resources in the Ciscarpatian region and the development of the fractional distillation technique for the production of kerosene fractions for lighting pur-

poses by Ignacy Lukasiewiczin the middle of the 19th century initiated the oil refinery upgrading processes in this area, which were later developed by Stanislaw Pilat (1881–1941). At the end of the 19th century and early in the 20th century the sugar industry was rapidly developed, in addition to the paper industry, the tanneries for leather production, and fats and oils processing, etc. The growing sulphuric acid production has often been linked to the manufacture of superphosphate. Numerous gas works produced town gas by the coal degassing process. Coal coking, based on the rich coal reserves, developed rapidly.

Between the two world wars, rapid progress was made in manufacturing paints, lacquers and varnishes, cosmetics, pharmaceuticals and synthetic dyes, etc. The separation and utilization of aromatic and heterocyclic components from coal tar was developing, which was also due to research on coal degassing processes, the physicochemical characteristics of the coal tar, etc. that was carried out by Wojciech Swiêtoslawski. However, at that time the chemical industry was not very significant. To change this situation, a government programme of modernization and expansion was announced. Particularly important in this was the role of Ignacy Moscicki, known from his earlier innovations and achievements in Switzerland and Poland concerning the formation and properties of the electric arc, the synthesis of nitrogen oxides and the production of nitric acid and hydrogen cyanide. It was that time that the large Chorzow Works was modernized and new products were added to its output (carbide, calcium cyanamide, nitrogen fertilizers, etc.). A large, completely new chemical factory was built near Tarnów (Moscice) to produce ammonia, nitric acid and ammonium nitrate (by the methods of Tadeusz Hobler, 1899–1975), etc. Both factories were headed by Eugeniusz Kwiatkowski (1888–1974) a talented manager. Altogether, almost 1000 chemical factories existed in Poland in the interwar period. It is worth mentioning that among them was a unit producing synthetic polybutadiene rubber from ethanol ('KER', Dêbica), being among the first in the world. During the Second World War this technology was passed to a US producer by the inventor (W. Szukiewicz).

The last 50 years was a period when the chemical industry, which was largely destroyed during the war, was rebuilt and expanded. At present, the industry employs over 230 000 people and has a stable share of nearly 10% in the sales of all of industry. It produces practically all the basic chemicals and almost all modern sorts of plastics, fibres, surfactants, rubber and fertilizers. It includes two large modern refineries (Plock, Gdansk) and several smaller ones, one large petrochemical centre (Plock—olefins, PE, PP, ethylene oxide, aromatics, etc.), several large companies with diversified, mainly petrochemical, production (Kedzierzyn-Kozle—ammonia, nitric acid, urea, nitrogen fertilizers, oxo alcohols, phthalates, formaldehyde, etc.; Pulawy—nitrogen compounds and fertilizers, cyclohexanone, caprolactam, etc.; Tarnow—nitrogen compounds and fertilizers, chlorine and derivatives, acetylene, hydrogen cyanide, acrylonitrile, cyclohexanone and caprolactam, PVC, polyacetals and other polymers, etc.; Oswiecim—synthetic rubber, polystyrene, PVC and other polymers, acetaldehyde, acetic acid and esters, chlorine and derivatives, etc.; Wloclawek—nitrogen compounds and fertilizers, PVC, etc.; Police—sulphuric acid, extractive phosphoric acid, nitrogen-phosphorus fertilizers, etc.; Bydgoszcz—polyurethanes, epichlorhydrine, other chlorocompounds, dyes, etc.; Torun, Gorzow and Lodz—respectively, polyester, polyamide and polyacrylonitrile chemical fibers) and many other companies. Some installations are of the highest world standard (licensed oxo-alcohols, hydrocracking and many others, as well as own caprolactam, low-energy consuming large ammonia unit based on autothermic catalytic reforming and partial oxidation of natural gas, etc.).

The process of modernization, restructuring, privatisation and development of the chemical industry is now in progress, supported by technological research in about 20 research institutes and centres (among them the oldest institute in Warsaw, created in 1922 by Ignacy Moscicki, presently called the Industrial Chemistry Research Institute), numerous faculties of chemistry at the universities and technical universities (polytechnics), and the scientific institutes of the Polish Academy of Sciences. As a result of their previous R&TD activity, this industry has developed a number of original technologies, some of which are now on the international market (sulfur granulation, sulfuric acid and oleum, cyclohexanone, caprolactam, bisphenol A, trioxane, dioxolane and polyoxymethylene, epichlorhydrine, nonylphenol, and some others). A process developed in Poland for making cyclohexanone from benzene via cyclohexane, known under the trade mark 'CYCLOPOL', has been licensed to many countries and is the basis for a substantial proportion of global cyclohexanone production.

The development of individual technologies was possible, due, amongst other factors, to the progress in theory and research concerning unit operations and processes. Fundamental and applied chemical engineering research initiated in Poland by Tadeusz Hobler were developed successfully by Janusz Ciborowski (1918–1986), Stanislaw Bretsznajder (1907–1967) and others, at several technical universities and at the institute of the Polish Academy of Sciences.

The carefully selected and now gradually introduced model of the ecology-oriented strategy of sustainable

development of the chemical industry is based in this country, similarly as in other countries, on programmes such as Clean Technologies, Responsible Care philosophy and obligations, Product Stewardship practice, 'cradle-to-grave' policy, etc. As the chemical industry is a particularly science-dependent and technology-based kind of industry, it has becomes clear, that chemical technology is a fundamental tool for the realization of an environmentally-friendly strategy. Bearing this in mind, The Chemical Technology Congress held in Wroclaw in 1997 named the main priorities in technological research areas concerning Process and Product Research and Technological Development. Among them are: all possible routes to increase selectivity (catalysts, optimization of parameters, recycling of by-products, etc.), to limit energy consumption (heat-exchange and utilization of heat, exothermic processes replacing endothermic, integration of the processes and operations, such as combinations of reactions via separation or heat transfer, a gradual replacement of distillation and cryogenic techniques in the separation of mixtures by adsorption and membranes, etc.), to limit, utilize and neutralize wastes, emissions and discharges (zero-waste and low-waste technologies, closed cycles, recycling and re-utilization, safe waste processing and disposal, etc.), to limit feedstock consumption and materials consumption in auxiliary operations (water treatment, steam production, etc.), to develop processes based on alternative hydrocarbon and non-hydrocarbon raw materials, some refinery processes (hydrotreatment of every kind, C_5–C_6 isomerization, alkylation on solid acids, etc.), some petrochemical processes (olefins production, chemistry and technology of C_1, methods of direct transformation of low alkanes, selective oxidation, hydrogenation and isomerization, polymerization on single-site catalysts, etc.), zeolite chemistry, biotechnology, the enrichment of poor mineral raw materials, among others. Priorities in more fundamental studies include kinetics, macrokinetics, mechanisms of reactions and of processes, dynamics of the system reagent-catalyst-reactor, multifunctional reactors, organization of processes, nonstationary conditions, new methods in modelling and process design, etc. The accepted priority programme also contains the main fields of research to develop advanced products and materials of various molecular and supramolecular structure and functionality (superengineering polymers, thermostable, nonflammable, biocompatible, biodegradable, composites, superabsorbents, materials for optoelectronics, adhesives, carriers for drugs, medicines or fertilizers, chemical fibres, special ceramics, catalysts, carriers, adsorbents, indicators, sensors and many others).

In all research areas, the ultimate aim is to improve existing or to develop new more advanced technologies, operations, equipment and products, environment-friendly, with low energy and feedstock consumption.

Various research centres are carrying out multidirectional investigations on chemical methods, catalysts, technology and engineering for environmental protection, on water treatment and waste processing, recycling and reutilization of by-products, waste and post-consumer products, on various syntheses of fine chemicals (specialities) and intermediates, biologically active compounds, on industrial analytical methods, on integrated computer-assisted control systems, and many other subjects.

Organization of chemistry research and education in Poland

There are 22 chemistry departments at 11 universities and 11 technical universities. Chemistry research is often present at Higher Schools of Agriculture, Medicine and Economy (altogether 24 chairs or institutes). There are eight institutes of the Polish Academy of Sciences which are involved in research in various aspects of chemistry. Apart from these institutions, there are 12 institutes working for industry which carry out research in chemistry—mostly applied chemistry.

Within the Polish Academy of Sciences there are two committees which collect members of the chemical community—Committee of Chemistry with the chairman Prof. Bogdan Marciniec, and Committee of Analytical Chemistry with the chairman Prof. Adam Hulanicki.

The Polish Chemical Society (founded in 1919) has more than 3000 members and every year it organises annual congresses with over 1000 participants presenting the results of research from all branches of chemistry and also many specialized symposia.

Funding for research is arranged via a Government Institution—the Committee of Scientific Research (Komitet Badan Naukowych) which evaluates grants and distributes financial support for research in higher schools and scientific institutions.

Acknowledgement

Helpful information from several persons and institutions is gratefully acknowledged, in particular: Adam Bielanski (Cracow), Adam Hulanicki (Warsaw), Tadeusz Marek Krygowski (Warsaw), Lucjan Sobczyk (Wroclaw), Marian Taniewski (Gliwice) and Aleksander Zamojski (Warszawa).

The Phuket Declaration

International Conference on Biodiversity and Bioresources—Conservation and Utilization, Phuket, Thailand, 23–27 November 1997

Preface

The Phuket Declaration, which is concerned with the conservation and sustainable utilization of biological diversity, was developed at the IUPAC International Conference on Biodiversity and Bioresources—Conservation and Utilization, held in Phuket, Thailand during 23–27 November 1997. The Declaration recognizes the sovereign rights of states over their natural resources and their authority to determine access, in compliance with the Convention on Biological Diversity. Under the Convention it seeks to accomplish the following important objectives:

- biological diversity must be protected, minimizing anthropogenic influences;
- the principle of sustainable utilization of genetic resources must be adopted; appropriate research activity should be carried out, if possible, within the source country and in close contact with local scientists;
- there should be a fair and equitable sharing of commercial benefits arising from this research.

Regional concerns over the over exploitation of biological resources led to the Manila Declaration in 1992, which was endorsed by the Bukittinggi Declaration in 1992, and followed by the Melaka Accord in 1994. These three documents outlined a regional standpoint to ensure the conservation and sustainable utilization of biological resources. The Guidelines to facilitate access to biological resources and the equitable sharing of benefits in the South-east Asian Region were prepared at the Workshop in Kuala Lumpur in April 1996 to ensure a fair and equitable sharing of benefits.

IUPAC recommendations on the Preservation and Utilization of Natural Biodiversity in the Context of the Search for Economically Valuable Medicinal Biota have been published in *Pure and Applied Chemistry* 1996, Vol. 68, pp. 2325–2332, taking into account IUPAC's global, strictly scientific and non-governmental mandate for chemistry.

At the Phuket IUPAC International Conference on Biodiversity, held during 23–27 November 1997, all scientists agreed that the principles outlined above, in compliance with the Convention on Biological Diversity should be implemented and the Phuket Declaration was adopted.

The Phuket Declaration concerning the conservation and sustainable utilization of biological diversity

Adopted at the IUPAC International Conference on Biodiversity and Bioresources Conservation and Utilization, held during 23–27 November 1997, in Phuket, Thailand. We the participants of the Conference outlined and agreed on the following principles:

- Recognition of the sovereign rights of the source countries over their biological resources, and of their rights to utilize such resources in accordance with their own environmental policies.
- Development of legislative measures by the source nations for conserving and sustainably utilizing their biological resources.
- Provision of incentives to promote the transfer of technology through collaborative research and training under '*fair and most favorable terms to the parties concerned*'.
- Ensuring the fair and equitable sharing of benefits arising from the utilization of biological resources.

It is recommended that the countries endowed with rich biological resources should:

1 Develop legislative measures to facilitate effective conservation and responsible access to biological resources and its molecular diversity.

2 Discuss the establishment of an effective coordinating/administrative body to ensure that the provisions of the legislative measures are properly implemented.

3 Adopt national systems of' licenses for foreigners and nationals who plan to have access to biological resources; develop cooperative research and development programs that ensure a mutually agreed level of science and technology transfer.

4 Provide an efficient process for granting a license with efficient mechanisms to obtain Prior Informed Consent from the source country and the local communities concerned.

5 Provide mechanisms for the protection of rights of local communities and indigenous people with a fair and equitable sharing of benefits.

6 Encourage collaborative research and training to be carried out preferably within the source country in order to enhance scientific and technological capabilities and ensure appropriate recognition of the contribution of host country collaborators.

7 Facilitate the exchanging of relevant information regarding scientific, technical, legislative and administrative protocols among collaborating countries.

ICSU Press Workshop

ICSU Press Workshop on Electronic Publishing in Science, Keble College, Oxford, UK, 30 March—2 April 1998—some observations

This three-day conference, officially titled 'Economics, Real Costs and Benefits of Electronic Publishing in Science—A Technical Study,' was planned to follow up on the Joint ICSU Press/UNESCO Conference on Electronic Publishing in Science that was held in Paris, France, during February 1996 (*Chemistry International* 1996, Vol. 18, pp. 165–169). The Oxford workshop attracted around 50 participants, about half of whom had been present at the Paris conference. Moreover, essentially all the organizations represented in Paris were again represented in Oxford. This useful continuity, together with the smaller size of the Oxford Workshop (50 vs. 150 in Paris) made for an unusually stimulating and interactive three days in the comfortable modern facilities at Keble College's ARCO Building.

Sir Roger Elliott (Chairman of ICSU Press and a former chief executive of Oxford University Press) set the stage for the meeting by challenging the attendees to describe an electronic publishing system for science that would have a number of desirable characteristics: (1) Gives authors' works visibility, with adequate quality control; (2) Can be accessed easily; (3) Preferably costs less than the current system; and (4) Provides adequate incentive and financial return to those (such as publishers) who 'add value.'

Fred Spilhaus, Executive Director of the American Geophysical Union, predicted that the present scientific publishing system was nonlinear, and that substantial, unpredictable changes would inevitably take place. He observed that the boundaries between 'chit-chat' and formal publication were becoming distinctly blurred in the electronic arena and that electronic enhancements will become both more complex and more costly. Anent Parekh, Professor of Physiology at Oxford University, expressed the enthusiastic view of many young academics, that electronic publishing offers users many advantages and relatively few disadvantages. Among the features Parekh found most helpful were currency, ease of access (including access from one's home computer) and the ability to look at and download additional data not usually printed in the paper journal. Donald King (King Research, Ann Arbor, Michigan), Terry Scott (until recently with the American Institute of Physics), and Owen Hanson and Robert O'Shea (Lindsay Ross International, Abingdon, UK), all pointed out that a comparison between the costs of conventional (paper) publishing and costs of electronic publishing must be conducted with great care. King stressed the need for a careful definition of terms, while the others emphasized that many costs (for example, those for peer review) do not disappear in the electronic publishing system and that there is no reason to believe, as some have suggested, that electronic publication is inherently less costly than paper publishing. Indeed, many enhancements in the electronic system—for example hot-linking and graphics display improvements—actually increase cost, they stressed. William Mischo (University of Illinois, Champaign-Urbana) described some of the technical difficulties inherent in archiving electronic journals, including the still substantial cost of archival storage, despite large decreases in storage device costs in recent years. He also raised the disturbing issue of the questionable readability in future years of outmoded storage vehicles such as 5¼-inch floppy disks and current-technology CD-ROMs. Bernard Donovan (Association of Learned and Professional Society Publishers, UK) had surveyed a number of publishers and concluded that substantial costs were incurred by scientific publishers in their conduct of peer review. He estimated such costs as typically between 100–300 GBP per accepted paper. Fytton Rowland (University of Loughborough, UK) challenged the assertion that users would find electronic publications so accessible and easy to use as to render librarians redundant. Indeed, he contended that the librarian and information intermediary functions will continue to be needed as never before, to cope with the variety and rather chaotic arrangement of materials on the Internet. Gary VandenBos and Susan Knapp (American Psychological Association) described a new all-electronic journal published by the APA; this journal has 2500 individual users, currently accessing it for no charge. However, there had been, and continued to be some resistance from potential authors and more resistance than expected from reviewers. Knapp also described an innovative pricing arrangement (still experimental) under which APA members with a print subscription to at least one APA journal could purchase in addition, at a very attractive price, access to a full-text database of all APA journals and/or to the Psychological Abstracts database. Knud Thomsen, a participant in a working group of scientists at fusion energy facilities scattered over many parts of the world, described the characteristics and problems of their system for mutual communication over the Internet. Many of these problems—for example, use of incompatible software versions and different e-mail systems—are extremely

germane to electronic publishing on 'the Net.' Abel Packer (Pan American Health Organization, Sao Paulo, Brazil) and Virginia Cano (Queen Margaret College, Edinburgh, UK) explained why scientists in developing countries are attracted to the possibilities of publishing electronically. Fundamentally, this attraction is related to the relatively low barriers inherent in operating a web site, provided that the web host possesses the ability to offer material in English, now the scientific 'lingua franca' of choice world-wide. Visibility can quickly be obtained electronically, but progress is still too often hampered in many countries by poor infrastructure (telephone system) and by a lack of computer availability or literacy. The same points were made by Attlio Bustos and Graciela Munoz (Catholic University of Valparaiso, Chile), who have developed the *Electronic Journal of Biotechnology* in Chile. Vitaly Nechitailenko (National Geophysical Committee, Russian Academy of Sciences) described some of the special problems posed by offering on-line a journal having extensive mathematics, where HTML representation is in some respects deficient.

Summarizing the status of a fast-moving and technologically sophisticated field such as electronic publishing is no mean feat, but workshop attendees attempted it with the assistance of David Pullinger of Macmillan Publishing and of the chairs of three break-out groups to which all attendees had been assigned during the last sessions of the workshop.

The following principal conclusions were among those generally agreed to by participants:

1 Electronic journals will become dominant (over conventional paper publishing) in the next 5–15 years.
2 Peer review and methods to 'brand' (indicate the quality of) electronic papers will be indispensable to successful electronic publishing.
3 Despite widespread expectations that electronic publishing will be less expensive than paper publishing, every evidence to date indicates that it may be just as expensive or even more expensive, depending on the sophistication and cost of electronic enhancements such as live graphics and hot links.
4 Publishers generally have done a poor job in the past explaining to authors and librarians how they have added value to authors' work. (This explains in good part why there exists the wrong expectation described in Conclusion no. 3, above.)
5 The ability to gather detailed information on the searching habits of scientists when they access electronic publications will pose ethical questions for publishers. Users should be informed about any information gathering practices used by electronic publishers.
6 The infrastructure—telephone systems, networks, etc.—that is in place in advanced countries will continue to need maintenance; in developing countries, and even in some developed countries, large capital investments are essential if the citizens in those countries are to share in the benefits of electronic publishing and other services made available via the Internet. Inevitably, government agencies will be looked at as the source of these investments.
7 Everyone agreed that there is an urgent need to maintain archives of electronic publications. But who should be the keepers of the archives? Conferees had little confidence in the willingness or ability of national governments or of commercial publishers to undertake this vital task. Not-for-profit scientific societies—presumably having an obligation to assure access to the record of their various disciplines—were seen as the most logical candidates for this Herculean task.
8 Electronic publishing has reached an exciting stage. There are now a sufficient number of 'products' in the marketplace that the next few years will bring a great deal of practical knowledge about how technical users react to these products, how they use them and—the $64 000 question—how much they are prepared to pay.

Michael Bowen, 4 August 1998

ICSTI General Assembly

Loch Lomond, Scotland, 21–25 May 1998

Attendees

Present were 43 people from 38 ICSTI member organizations, 3 observers, 5 speakers and 3 people from the Secretariat. There were representatives of various international organizations and attendees from UK, USA, Netherlands, Canada, South Africa, Japan, France, Russia, Taiwan, and Sweden.

Electronic libraries—relationships between suppliers and customers

The primary publishers' viewpoint

Ian Bannerman, Blackwell Science

Blackwell Science are unusual in that often they are publishing under license for learned societies, so they

Free access

Pros	Cons
Can provide critical mass of users	Can swamp the service
No administration of payments or security problems	Stores up problems
Promotes titles/organization	Tests the technologies not the product
Users should be tolerant of problems	Undermines the value of copyright
	Does not encourage internal discipline
	No money!

So, you need to be clear why you are giving it away free.

Online linked to print (i.e. online is bundled with print).

Pros	Cons
Preserves revenue in short-term	Not necessarily what customer wants
Print as back-up and archive for all customers	Does not resolve format question
Offers added value	Does not allow savings
	Acts as a straight jacket

do not hold the copyright. The creation of digital content should be integral with print systems. They use PDF full text, and HTML for headers. They chose not to have an Elsevier Science Direct or Springer LINK type of service, instead they use intermediaries such as BIDS to deliver the content.

Blackwell Science studied pricing policy. The market expected electronic journals to be cheaper than print but online publishing creates additional costs. At first the pricing policy was online price 90%, print 100%, online plus print, 130%. We are all caught in an inflation-

Online only

Pros	Cons
Provides customer choice	Archival problem needs to be addressed
Potential for cost savings	Requires faith in the quality of the service

Product bundles ('For 10% more you get access to all our materials')

Pros	Cons
Easy to sell to accountants	Undermines collection development role
Increases penetration of all titles	Short-term insulation from market forces
Mops up finite funds in the short term	May not be scaleable or sustainable
Once negotiated, easy to administer	Assumes all titles are valuable
	Difficult to negotiate

Consortia (Libraries club together.)

Pros	Cons
Avoids duplicated negotiation	Consortia differ in size, infrastructure, budget and cohesion
Good PR (public relations)	May be no sense of local ownership
Provides critical mass of users	Can be high risk—all your eggs are in one basket

Transactional pricing

Pros	Cons
Already part of the economy but currently yields little revenue	May be difficult to budget
Statistical data	May undermine subscription revenue (especially to high price titles)
Provides a richer product mix	May undermine nonsubscription revenue from industry, e.g. offprints to pharmaceutical industry

ary spiral (journal subscription cancellations lead to reduced profitability lead to publisher price increases lead to reduced spend on journals) but the tendency is for publishers to increase prices, since cancellations do not cause as much loss as price increases cause profit. Electronic publishing may break us out of the spiral.

'*There are no stable or half-way solutions for launching the learned periodical literature onto the post-Gutenberg galaxy*' (Steven Harnard). Pricing options include 'free' access, online linked to print, online only, product bundles, consortia and transactional pricing (document delivery). Bannerman considered the advantages and disadvantages of the various options in the Tables below.

When Blackwell Science chose to charge 130% of the print price for print plus online, customers focused on the 30% surcharge, not on the actual price. The focus is on the add-on, not on the real problem or benefits. The real problem was how much the *print* costs in the first place. Bannerman cited some figures from the University of Georgia figures, comparing various publishers. There is a big difference between Publisher A adding 10% to its average journal price of $1400, and Blackwell Science adding 30% to its average of $473.

Blackwell Science was involved in the UK National Pilot Site License. The old model was that Higher Education Funding Councils (HEFCs) paid HE institutions who used subscription agents, while the publishers supplied the journals to the HE institutions. The new model links HEFCs directly with publishers who supply journals (with a site license) to the institutions, although institutions still use agents to order from the publishers.

The experiment is coming to the end. One problem for Blackwell Science is that universities might use the cost savings not to cancel subscriptions to Blackwell Science's competitors. A new project is NESLI, the National Electronic Site License Initiative. In this model, HEFCs will pay a managing agent (Swets and the University of Manchester) and electronic delivery is separated from print delivery. This new model is not yet commercially acceptable to Blackwell Science.

He concluded that we are faced with instability for the foreseeable future. There are *no* stable pricing and licensing models for online journals. There are no 'sacred cows': universities cannot always have interlibrary loan (ILL), free archival access and annual subscriptions. A single solution is not universally applicable.

There was some discussion about the delivery of single articles instead of full journals. Bundling is not done by subject area but this could make sense in the future. Herman Spruijt of Elsevier said that we must accept that the next generation may want the 'article' rather than the journal. We have to look at the 'container'.

Finally, Bannerman produced the following table:

	Examples	Payment	Usage Data	Price Control
Publisher run	Journals online	Full, intermediate	Full; article and customer	Complete
Commercial docdel	Uncover; ISI	Full, frequent	Partial	Control of copyright component
RROs	CCC, CLA	Unpredictable	Inadequate	Disconnected
Other	Fair (or unfair) use; ILL; BLDSC; library privilege	None	None	None

The primary publishers' viewpoint

Brian Thackray, Aslib

Aslib has only 10 journals, but some are of high impact in information science. Five of them are online in some form. It is *making money* that is the Holy Grail: the content is already on the Web. We are about to see the 'reinvention' of the journal. Publishers tend to be traditional; the academic community also tends to the conservative. So, reinventing the journal is tricky. Aslib is involved in BOPCAS, the catalogue for British Official Publications Current Awareness Service, at the University of Southampton. This is a free online bibliographic database of British publications, funded by the Joint Information Systems Committee (JISC) in the UK. Aslib have an award from the Department of Trade and Industry to continue this work.

Aslib has looked at the concept of advertising revenue. Advertising usually costs GBP 0.02–0.08 per page view, but this is dependent on the specific nature of the online content, and on the advertisement. Thackray reckons that users will pay to keep advertising off the site because they do not want access slowed by graphics, but how much are they willing to pay? Aslib still wants to offer a 'free' service, so it is looking into different pricing bands for the added value services.

Aslib, with money from the EC, have been working on a new model. The 'container' will change by means of refined electronic feeds with value-added to the articles in the journals. The 'information refinery' approach will involve discussion group formats. The focus groups are willing to pay (in pricing bands) for various added value services: content-based bundles of information, delivery for use on customers' intranets, etc. The transition to electronic publishing will not be easy.

The secondary publishers' viewpoint

Jim Lohr, CAS

Jim began by giving statistics for the huge amount of information available, and the size of CAS databases. Life was simpler when a library was a library. The digital electronic age enables the formation of a nontraditional library, which we may call an 'aggregation'. All the traditional suppliers in the old information supply chain want to evolve and survive in the digital age. All are trying to fill the library function with some sort of aggregation or access scheme.

The CAS perspective on chemical information libraries focuses on a broad set of end-users. It aims to simplify access, provide effective searching, be as comprehensive as possible and offer multiple delivery options. The linking model uses the Internet to provide a broad economic access to a broad user base. The model responds to current business practice realities: many publishers are not willing to load their materials on others' sites; many publishers are establishing their own sites and want to do things their own way. The CAS model unites search and access capabilities.

The service is called ChemPort (http://www.chemport.org). It uses Internet access. Searching is via CAS databases. There are direct links to publishers for retrievals. Subscription services are available via the publishers. Document delivery is available offered from the publisher and/or CAS. There is reference linking. As of last December, eight publishers were involved. This is just one idea for the electronic library. It will evolve with time. It is not the only answer.

After the talk, someone asked whether there will be no need for secondary publishers in future. Jim said that a search engine may be OK for the *New York Times* but chemical information is different because of the nature of chemical structures and the bizarre terminology of chemistry. Thackray suggested that secondary publishers should do subject area 'Yahoos'. Kurt Mulholm says that *all* languages are arcane and full text search engines will never cope with them all.

Dick Kaser, National Federation of Abstracting and Information Services (NFAIS)

Kaser reported on a session entitled 'The economics of scholarly publishing: primary publishing models and user response' held at the 1998 NFAIS Annual Conference. There are four options: the publisher licenses the entire journal collection in electronic form to library consortia, the user buys the journal and gets the electronic text, the user buys by subscription or one article at a time, and to print or not to print at all.

He went on to summarize his conclusions from three NFAIS conferences. Publishers and users seem to be speaking different languages. Today's customers may well be the library consortium and the corporate intranet but the end-user is driving the process. A new model seems to be emerging but it is actually an old one.

The linear distribution model (author to primary publisher to secondary publisher to subscription agent to online vendor to library to user) is dead. The old model had collections of journals, buyer collectives, collection pricing and unlimited access; the emerging model also has collections of journals, buyer collectives, collection pricing and unlimited access.

It is the publishers' and distributors' perception of reality that is dying. The users' perception of reality is enduring and is driving the rest of us to change. Our top-down model is being pressured from the bottom up. The 'new' paradigm is actually an old one: the subscription model with end-users the beneficiaries. The envelope is bigger and so are the buyers. The users remain the same but we are getting closer to them than we have

been in a long time.

The user perceives that information is a public good, is above ownership, is beyond government control and is of great value but little cost. It is there when you need it, accessible, findable, copyable, cut and pasteable, transferable and not restricted. The user believes that information itself has no monetary value (the corollary is that the bulk of information is worthless). Once a gem is found a copy should be kept (the corollary being that users will take what they can get free but they will pay for items they want to possess).

In the new paradigm, lots of users use lots of networks and access indexes, catalogues and search engines. Today's questions are as follows. How big should we let groups be? How should print and electronic prices interrelate? Can pay-per-use coexist with subscriptions? Should rights to current content extend forever? How might copyright law override licenses? What do purchasers want?

Kaser drew attention again to Fisher's statement 'Our focus is now on learning how end-users use the journal and use our content with other content'. Axioms that arose from the NFAIS meeting are as follows. Pricing should not inhibit usage. Keep the end-user in mind. User-friendly systems can dramatically increase the use of materials. 'A lot of researchers are happy with inferior aggregations' or 'What I really want is access to quality'.

Kaser had these words of advice. Become a user of electronic information. Distinguish between customers and users. Negotiate with customers but think like a user. Know that each barrier you erect has a price (to you). Don't dwell on the past. Think of the potential. In e-Utopia, full text will be set loose, links and citations encouraged, browsing permitted, spontaneous purchases supported and re-use endorsed. The challenge is to maintain the revenue stream so that we can continue 'publishing', to manage in an orderly fashion the movement from print to electronic and to expand readership of the journal. We are in the habit of thinking that scholarly publishing is propped up and therefore we must erect barriers to protect ourselves. Scholarly publishing may no longer need to be an artificial economy, if we can just restore the relationship we once had with our real users.

The intermediaries' viewpoint

S. Wilson-Higgins, Blackwell's Information Services

Blackwell's Information Services products are the online bookshop, Electronic Journal Navigator, which concentrates on delivery of journal articles, ESP which is a CD-ROM database in a Web environment, and Collection Manager focused on book materials. Blackwell Science is carrying out the Higher Education Resources Online project which is studying on-demand printing.

Libraries need training and support to use electronic journals. There is a multiplicity of requirements and libraries continue to seek value for money. They will buy collectively to increase access and cap price increases. Their customer service requirements are greater and they do not want primary-publisher-centric access.

Primary publishers' launches are late and diversity is the rule. Primary publishers want contact with the users of their e-journals, and they want to defend their revenue streams. Licensing to consortia is increasing, license management is an issue and prices and packages vary.

For secondary publishers, database aggregators and document delivery services, license driven models prevail. There are more links to primary publishers and agents. Migrating to the Web can slow down access. Pay-per-view is increasingly available.

Blackwell Science believes that listening to customers and suppliers pays off. Monitoring usage across 'many to many' is a valid proposition. Customers need Blackwell Science's assistance to access and try new information services from publishers. Archiving and refreshing data is vital for the future. Good and consistent service remains a competitive differentiator. All new electronic services are 'works in progress'. New competitors will continue to emerge and challenge traditional competitors (Northern Lights, Profound, etc.)

Wilson-Higgins then presented a view of 're-intermediated agent services'. In this model, agents supply an electronic service, electronic budgetary control, advice and support for electronic publications, assistance with electronic access, electronic marketing and usage information and arbitration and documenting of agreed terms. (Administration of electronic acquisitions is a nightmare at the moment.) The agent in this new role will validate multipublisher electronic access, handle high volume transactions, handle electronic billing, facilitate multiple format access, handle electronic license administration, and monitor electronic usage statistics.

The right grouping to handle licensing might be a virtual community organizer such as OhioLink, GlaxoWellcome or the Royal Society. It makes it easier if the community has a common or single source of funding, a common interest and a common legal jurisdiction. Archiving electronic publications is very important. Current technology for electronic fair use and loans is not adequate: in future a trusted system is possible.

Purchasers want more certainty in the purchasing framework, to reduce the 'cost of purchase' (e.g. password administration), and, ideally, more for less (a good deal with tangible benefits and value for money).

The first topic in the discussion session was archiving. The British Library has no funding to do this but it is

reporting to the UK government on deposit of electronic documents. Since last year, the American Institute of Physics (AIP) seems to have diluted its promise of access in perpetuity. Terry Scott (now retired from AIP) also reported that there are significant data protection issues in monitoring usage. AIP destroys its records once they have been processed.

Ian Best, Faxon (part of Dawsons)
The library marketplace is moving to consortia for buying electronic products. End-users want desktop delivery for selected disciplines and they want linkage to the primary information. Usage is shifting to the end-user. End-users demand more features and the product must be Web-enabled. Access must be independent of geography. Clients still want an agent to process their orders. Best was astonished by the primary publishers' comments about getting closer to the client.

Post-Web re-intermediation brings new rules and roles for all parties. Value-added services will be created to cut through information overload. The information's usefulness will be increased. Information will be integrated into internal processes and will facilitate strategic decision making. Publishers are struggling with the evolving business model, maintaining brand identity, technical challenges, and resource allocation and restructuring. Few publish enough titles to make the right bundles. Librarians worry about archiving, budgets, technical challenges and resource allocation and restructuring. Users care about peer review, the tenure system and the imperative to publish, and finding information quickly and integrating it into their own work. Aggregators have to define the product and the market and remain flexible about business models and file formats. There is a lack of standards and infrastructure. Content providers are conservative and each publisher is different. Integrating all the information into the same chain is a problem.

The purchasers' viewpoint

Michael Breaks, Heriot-Watt University, Edinburgh
Heriot-Watt spends 10% of its budget on electronic items but 90% of staff time is spent on managing electronic resources. Library budgets are stable but clients have increasing expectations. There are more students and mature students are less familiar with libraries. Budgeting is decentralized in some universities, i.e. faculties may be making library decisions. Libraries are going through a transition phase and are agents of change on campus. Distance learning and off-campus access are also issues.

Students think of the Internet as a virtual library. Elaborate log-on procedures (authentication and authorization) are a problem, although JISC is nearly at the point of standardizing this. Some universities are merging their library and IT services. The IT infrastructure (desktop/campus/national/international) has to be considered: JANET has been 'free' (actually paid for by 'top-slicing' from grants) in the past but now some network access may be charged.

Teaching, learning and research make conflicting demands. The library users are students but most of the library budget goes on journals for researchers. The Research Assessment Exercise (RAE) rankings are used for funding while TQA assesses the quality of teaching and of the library. There are tensions between RAE and TQA. As regards collection development, every institution has a different mission.

Breaks listed the following obstacles to the use of electronic information services: skills training and awareness, lack of exemplars, lack of national and local vision, lack in key areas, pricing and licensing, too much variety in access methods, and IT infrastructure.

What do libraries and users want? They want to go from a reference to an article. Access and holdings are not two different things: preservation of electronic materials is essential if access is to be guaranteed and the user is to accept loss of the print holding. They want sustainable price models: they cannot afford 'print plus'. They are used to a 'free at point of use' model: transaction pricing gives them no control. The publisher/subject/aggregation question is like comparing a supermarket with a boutique: you actually need both of them.

Libraries need a standard interface for access. They need measures of effectiveness to determine if they are getting value for money. They want to get figures for usage from publishers. They want consortia purchasing. 'Fair use' ('fair dealing') is well established in the print environment: it is wanted in the electronic environment too. There must be electronic-only options. Standard license terms are needed: negotiating with individual vendors is a problem. Libraries do not like noncancellation clauses. Integrated access (compare channel hopping in a TV environment), 'walk-in' access (for people outside the university) and institution-wide access are needed. Libraries want a critical mass (in breadth and depth) and value-added features such as rotating chemical structures within a journal.

Finally, Breaks mentioned the Distributed National Electronic Resources. There is a JISC group working on content and a collections policy is being formulated. National Data Centers (e.g. BIDS and MIDAS) have been established. Charging models may differ between small and large institutions. The 'hybrid library' programme is carrying forward lessons from the electronic library programme. There is a also a 'New Library' concept of bringing in the public libraries as well.

In the discussion session, Eamon Fennessy, the

Copyright Group, USA, asked what constitutes fair use in an electronic environment. The answer seems to be that libraries do not want to make multiple copies. Copying is not displacing a sale because they would not buy the material. Herman Spruijt asked whether there was still a place for print. Apparently there is, but the house of cards built on print may collapse as the Internet, etc. takes over.

Tom Graham, University of Newcastle

The stakeholders in hybrid libraries are customers, publishers *and* authors. In an electronic environment there are different relationships, different production models, different cost models and different price models. Cost and pricing are *separate* issues. There is a variety of journals, and parallel publishing has increased the awareness and use of electronic journals. Can electronic production be cheaper? The jury is out on this. The 'first copy' argument is less than convincing. The publishing industry has not had to learn about efficiency.

Why is there a 'licensing' pricing mechanism? There has been a shift from ownership to providing access. Electronic publishing is governed by contract law: you do not 'own' something as you do with a print copy. Site license pricing has the advantage that the price is predictable and 'free at point of use' but you end up paying for material you do not want. With transaction pricing you pay per use of material from a publisher or aggregator and you only pay for what you want. It is easy to establish usage figures, but the cost is not predictable.

A problem with national licensing is the variety of terms: the administrative cost of doing it is high for all parties. The Pilot Site License Initiative (PSLI), the objectives of which were to test and evaluate several models, ends at the end of 1998. The National Electronic Site License Initiative (NESLI) is now starting. JISC will run it and Swets/MIDAS will manage it. The benefits will be a single interface to a single access point of journals, access by subject, search mechanisms, usage statistics, and a single deal with lots of publishers. Publishers will be able to negotiate with a single HE source and they will see a reduction in marketing costs. There will be a single point for ordering and billing, and pay-per-use revenues.

It is not yet known how print and electronic products will be unbundled. The cultural aspects of the project are very important. The devil is in the detail: not all the details have been thought out yet. Aspects of use to be considered are fair use (or fair dealing), dial-up use (e.g. from home), the definition of users (including perhaps the National Health Service), document delivery, walk-in use, course packs and the library's responsibilities. Access cannot be restricted to 'this library' or 'this site': it is the user who matters and the user requires continued access over a number of years. Authentication and archiving are also issues.

New pricing models are needed, with different levels as well as different mechanisms. The funding reality is that library budgets will *not* increase. Bundling and 'online plus print' may not be the best options. Development costs must to be shared among more players. Differential pricing options are also needed.

In the discussion session, Dan Wilde, NERAC Inc., USA, could not see why libraries think it is cheaper to produce electronic journals in terms of the totality of a system. A librarian agreed that librarians do not necessarily believe it is cheaper but some users certainly do. Ian Best said that some people think that the paper product is a by-product of the electronic one because they see the electronic version 6–8 weeks earlier.

Restructuring and rationalization in the information industry

Koji Tamura of Japan Science and Technology Corporation (JST) outlined how JST was tackling the problems of reduced usage of information services since 1992. The stagnation appears to have arisen from saturation in the use of information services that happened during the economic boom, collapse of the bubble economy, and a rise in the number information services competing with each other.

Ruggero Giliarevsky of VINITI told us how VINITI is still producing 1 million abstracts in Russian a year, with its staff cut from 2500 to 1040 people and with a budget of just $160 000 per month. Quality is inevitably a problem. Only 40% of VINITI's money comes from the government. The rest comes from sales of journals and databases. Unfortunately Russian scientists cannot afford to buy: export needs to be stimulated. There is no document delivery service although the St. Petersburg library can distribute hard copies.

Carel Jonckheere of EPO talked about the Distributed Internet Patent Service which is not aimed at patent information professionals but at end-users. In the first phase, the most recent 24 months of information from 19 European patent offices, and from WO patents is being made available with limited text searching. In Phase 2, online delivery of full facsimile documents is planned. There will be 29 million patents available.

Kurt Mulhulm of the Defense Technical Information Center talked about CENDI: a name derived from government departments of Commerce, Education/Energy, NASA/NLM, Defense (DTIC and NAIC) and Interior (USGS BRD). CENDI is a group of information managers who share knowledge resources. Mulhulm gave examples of the great variety of information these departments have on their Web sites. Free MEDLINE

usage has increased tenfold since the introduction of PubMed and 30% of the usage is by the general public. Critical success factors were acquiring world-wide information of interest to the customers, developing highly automated processes, assuring customers of information integrity, offering a single look and feel, providing analysis tools and establishing a world-wide infrastructure.

The Digital Object Identifier System

Norman Paskin, Director of the International DOI Foundation, gave an update about DOI. It is a unique identifier of a piece of digital content and it is a system to get to that content. It has been called 'the ISBN for the 21st century'. It was launched in October 1997. DOIs are an application of the Handle System of the Corporation for National Research Initiatives. The Handle System is a distributed computer system for naming digital objects and storing the names and information that is needed to locate and access these items via the Internet. The DOI system is in use now but it is not yet fully scaled up to a commercial system. It has international support.

The DOI System guarantees persistence and prevents the '404 not found' problem. It is being made available as an open standard and is not a proprietary company effort. It supports browsers. Handles resolve to data types and offer potential for resolving URNs and multiple URLs. New data type definitions will also be supported. From the users' point of view a Handle will link a name to a location, i.e. an Internet address. At the location there could be an object (such as a document, an image or an order form) or there could be an entry point such as an option list (a catalogue or a rights list).

The DOI system has three components: the Identifier, or DOI, which is the name for a piece of content, the Resolver, which takes the name and finds a location, and a Database which takes the name and gives information about the content. The DOI (e.g. 10.1016/(PII)S1384107697000225) can use any existing name or identifier (e.g. 10.1016/SICI00062510(19950506)107:18<94:BIMAJF>2.0.TX;2F) and the existing names do not have to be standard.

The DOI System is the mechanism, and the DOI Foundation is the governing body which sets the rules of the System and carries out further development. It is not necessary to join the Foundation in order to use the System. The International DOI Foundation is a nonprofit foundation run by a Board elected by and from its members. Membership income ($10 000 or $30 000 per member, depending on the type of company) funds development. STM, AAP and IPA are Charter members. Paskin, appointed in March, is the first full time staff member. DOI does not provide a standard numbering system where none exists, or provide copyright protection, but it does provide the basis to build these. DOI is not fully developed. It is intended to be useful in the protection of intellectual property but DOI assignment does not imply rights other than assignment. The Foundation is now recruiting members. About 20 organizations have committed already (including Blackwell Science). For further information, see <http://www.doi.org>.

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Subcommittee on transport properties of commission I.2: Thermodynamics summary minutes of the June 1998, Amsterdam meeting

Nine scientific presentations were made on specific topics related to the ongoing projects of the Subcommittee.

Standard reference data for the transport properties of fluids

New recommendations for the:
(a) viscosity of toluene at atmospheric pressure,
(b) viscosity of propane,
(c) viscosity of *n*-butane, and
(d) thermal conductivity of propane

were concluded. The resulting papers, reviewed by two members of the Subcommittee, will be published under the auspices of the Subcommittee.

Work that will continue refers to propositions for recommendations for the: (a) viscosity of toluene under pressure, (b) viscosity and thermal conductivity of methane + ethane, (c) thermal conductivity of *n*-butane, (d) viscosity of iso-butane, (e) viscosity of liquid water, (f) viscosity of *n*-pentane, (g) viscosity of alkali chlorides.

Standard reference value for the viscosity of water
The new proposition from ISO for a new value for the viscosity of water that incorporated the previous comments of the Subcommittee was considered and agreed.

Midas databank of transport property data
It is hoped that the work carried out by Prof K. Stephan and Mr R. Krauss in compiling all recent and unpublished results on transport property measurements will be continued normally.

Air quality in Croatia

This is one of a series of reports by Commission VI.2 on air quality in the member countries of IUPAC.

Air quality in settlements has been improving in the last 10 years. The reasons for this improvement could be found in the introduction of natural gas, introduction of heating facilities operated from heating plants, substitution of coal with other fuel types and gradual reconstruction of the Croatian economy towards environmentally cleaner technologies. In 1995 the air protection law came into force, and the problem of air pollution has been put under more systematic control.

Emissions inventories for eight pollutants (SO_2, NO_x, NMVOC, CH_4, CO, CO_2, NH_3 and N_2O) have been established for Croatia in accordance to the European programme for such emissions inventories. Emissions have been determined for the time period 1990–95. In addition, for the years 1990 and 1995 emissions of Hg, Cd and Pb have been determined as well as emissions of stable organic compound for 1990 (Fig. 1).

Due to the war in Croatia, the standard of living and economic activity were reduced, resulting in a reduced emission of pollutants (Table 1).

The emission of sulfur dioxide has been reduced by 65% mainly due to the reduction of the sulfur content in petrol fuels, and the closing of some large industrial sources of SO_2. NO_x emissions come from road traffic (41%), other traffic (28%), combustion power plants (12.8%). Non-methane volatile organic compounds (NMVOC), very important compounds for photooxidant production and global warming, are mainly emitted from natural sources (49.2%), usage of solvents (15.1%), road traffic (20.3%) and nonenergetic industrial processes (5.9%)[1].

Surface ozone measurements in Zagreb, the capital of Croatia, were performed as early as the end of the 19th century, but the first ozone measurements using automatic monitoring equipment took place in the centre of Zagreb in the spring and summer of 1975.

Continuous measurements of photochemical air pollution in the atmospheric boundary layer above Zagreb (8 years mean ozone value 25 p.p.b., but with very pronounced diurnal variation due to local effects) and the nearby elevated Puntijarka site (980 m a.s.l.)(8 years mean ozone value 40 p.p.b.)[2] were supplemented by summer season measurement campaigns along the Adriatic coast[3,4], which has greater insolation and Mediterranean flora with many different sources of NMVOC.

Locations along the Adriatic coast were chosen so as to be representative of tourist resorts at different distances from larger pollution sources. Starting from the north, one site was on Krk island in Malinska, relatively

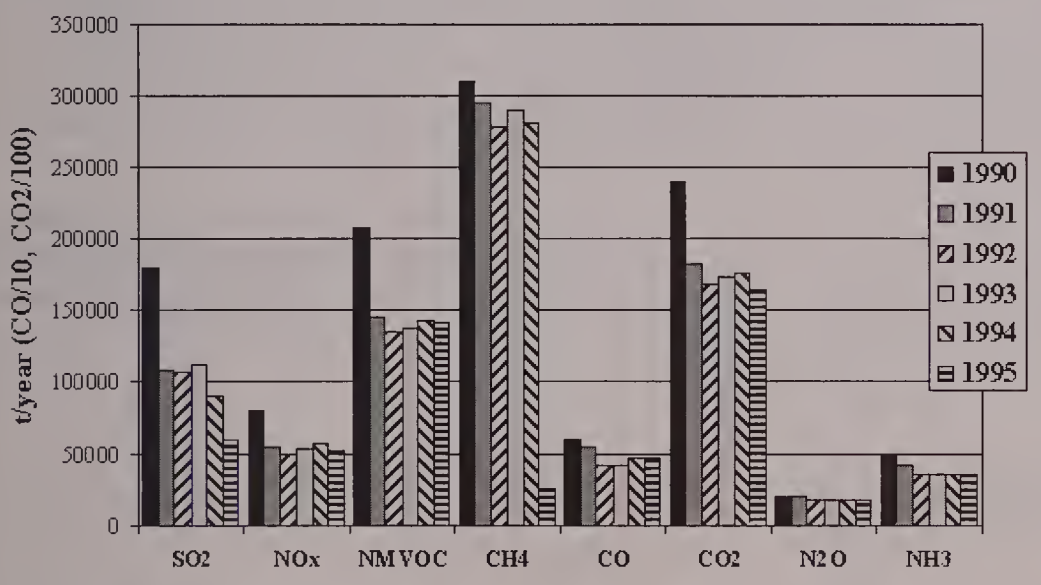

Fig. 1. Emissions of pollutants for the period 1990–1995 in Croatia.

Table 1. Reduction of emission in 1995 in relation to 1990

Pollutant	SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3
Reduction (%)	65	34	32	21	26	35	18	27

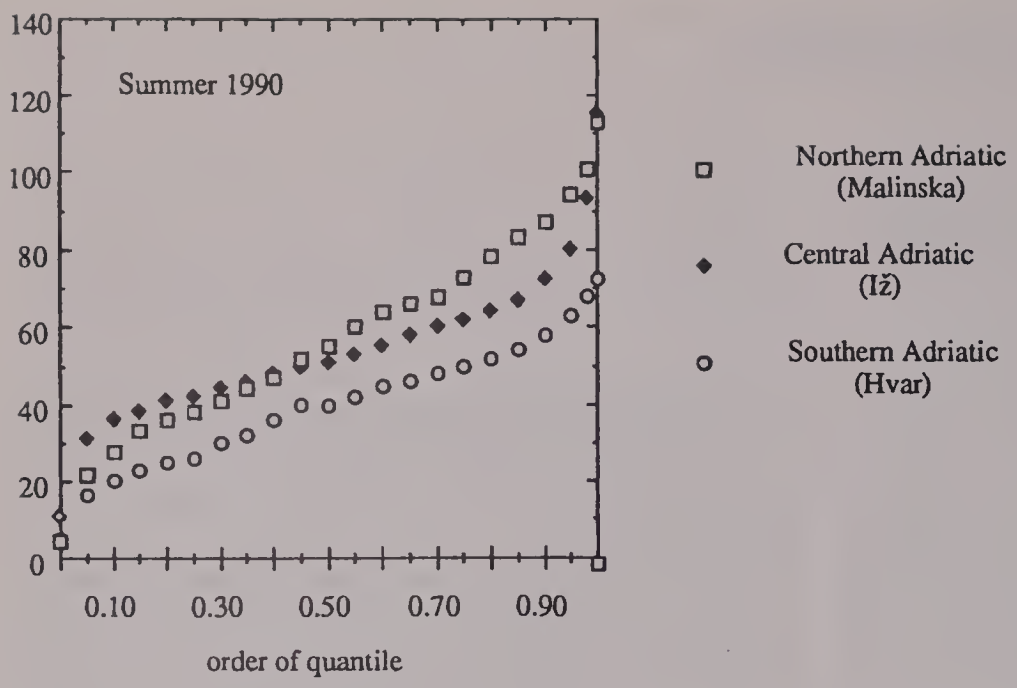

Fig. 2 Distribution of hourly average ozone volume fractions obtained at different sites along the adriatic coast in Croatia

close (25 km SSE) to the city of Rijeka. The second monitoring site was on the island of Iž in the central Adriatic, which can be considered to be isolated from larger pollution sources. The third site was in the southern Adriatic in Hvar on the island of Hvar, an important tourist resort (Fig. 2.).

To characterize a measurement site, an index defined as the average ratio between the maximum and minimum daily hourly average ozone volume fraction was introduced[3,4]. Zero values for hourly averages were assigned the value 0.4 p.p.b. in order to avoid division by zero. For urban sites with strong photochemical pollution, this index has a value of over 10, in the upper boundary layer and above, where there are no sources of precursor molecules which act also as sinks during night-time, it is less than 2. In less polluted urban and suburban sites as well as in some rural locations, where some photochemistry takes place, it will be of the order of 2 to 5 reflecting formation around noon and destruction during the night[4]. The corresponding values for five measurement sites in Croatia are compared in Table 2.

Table 2. Index of photochemical pollution for five different sites in Croatia

Location	Time period	Index
RBI (Zagreb)	Apr–Sep 1991	16.0
Puntijarka	Apr–Sep 1991	1.6
Rovinj (northern Adriatic)	Jun–Aug 1991	4.8
Iž (central Adriatic)	Jun–Jul 1991	1.9
Hvar (southern Adriatic)	Jul–Aug 1990	2.7

References

1. Neæak J, Jelaviæ V. The proceedings of the Symposium on air protection, pp. 31–42, 1997, Crikvenica, Croatia.
2. Klasinc L, Butkovic V, Cvitas T, Kezele N, Lisac I, Lovric J. In: Øystein Hov (ed.) *Tropospheric Ozone Research*, Springer, Berlin, 1997, pp. 222–229.
3. Cvitas T, Klasinc L. *Boll. Geofisico*, 1993, **16**, 521–527.
4. Cvitas T, Kezele N, Klasinc L, Lisac I. *Pure Appl. Chem.*, 1995, **67**, 1450–1453.

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New from AOAC

FDA Bacteriological Analytical Manual (BAM), 8th Edition, Revision A, 1998.

For use in regulator, academic, or industry laboratories, this recently updated manual contains the methodology currently in use in US Food and Drug Administration (FDA) laboratories for the detection of micro-organisms and certain of their metabolic products in foods, beverages, and cosmetics.

The 1998 version of the 8th edition contains over 300 pages of revised material. Revision A includes updates to selected BAM chapters and other new information. It also incorporates editorial corrections to the 8th edition published in 1995.

New information includes:

- The chapter on *Campylobacter* includes a new enrichment broth, simplified sample processing procedures with product-specific flowcharts, and an improved, blood-free isolation agar.
- Procedures with enhanced sensitivity have been added to the chapter on Staphylococcal enterotoxins.
- The chapter on *Yeast and Molds* now utilizes media that retard growth of bacteria and permit more accurate enumeration of yeasts and moulds.
- The *Parasitic Animals in Foods* chapter has been expanded to include the FDA's protocol for PCR identification and microscopic detection of *Cyclospora cayatenensis*, an emerging protozoan pathogen that has been involved in several recent food-borne outbreaks.
- Appendix 1 is a compilation of selected commercially available methods kits, which has been updated.
- Appendix 2, on Most Probable Number enumeration of bacteria has been revised to accommodate new statistical assumptions and to clarify this statistical treatment for analysts without extensive background in statistics.

Highlights of the contents

- Food Sampling and Preparation of Sample Homogenate;
- Microscopic Examination of Foods;
- Care and Use of the Microscope;
- Aerobic Plate Count;
- *Escherichia coli* and the Coliform Bacteria: *Salmonella*, *Shigella*, *Campylobacter*, *Yersinia*, *Vibrio*, *Listeria*, *Staphylococcus*, *Bacillus*, and *Clostridium* species;
- Diarrheagenic Enterotoxin;
- Yeast, Molds and Mycotoxins;
- Parasitic Animals in Foods;
- Analysis of Milk;
- Examination of Canned Foods;
- Examination of Containers for Integrity;
- Microbiological Methods for Cosmetics;
- Identification of Food-borne Bacterial Pathogens by Gene Probes;
- Investigation of Food Implicated in Illness;
- Detection and Quantification of Hepatitis A Virus in Shellfish;
- Residual Phosphatase in Cheese;
- Appendixes: Rapid Methods for Detecting Foodborne Pathogens; most Probable Number Determination from Serial Dilutions; Media and Reagents.

614 pp. 8th Edition, Revision A. 1998. Illustrations. Looseleaf with Binder. ISBN 0 935584 59 5. $129. Add $10 for shipping to US/Canada, $45 to other countries, Stock no. 1800. For more information write to AOAC International-D8IBP, 481 North Frederick Ave., Suite 500, Gaithersburg, MD 20877-2417, USA.

Federation of European Chemical Societies

Millennium Project: Celebration of the 100 most distinguished European Chemists from the Chemical Revolution to the 21st Century

The Federation of European Chemical Societies (FECS) is initiating, as a Millennium Project, the celebration of Distinguished European Chemists spanning a period of over 200 years.

Member societies of FECS are invited to submit their nominations of distinguished European chemists from, say, the end of the 18th century until the present day. In addition to Nobel Prize winners, there will be nominations of many others from Europe who have, over more than two centuries, transformed the science and influenced others across the world.

It is suggested that FECS member societies may wish to arrange for their Boards to establish a working group to develop their list of nominations. Individuals will also be given the opportunity to submit nominations via the FECS web site.

The process of evaluating the nominations will be considered by the FECS Executive Committee when it meets in September 1998.

Publicity for the outcome of the first part of the project will be considered during the next 6 months and will be aimed at the year 2000. Member societies are encouraged to let the FECS Secretariat know if they have any suggestions for publicity.

The closing date for nominations is 26 February 1999.

E. K. McEwan, FECS Secretariat,
July 1998

World Health Organization publications

Guidelines for Poison Control

This book provides authoritative guidelines for the establishment or improvement of national programmes for poison control. Addressed to policymakers and the administrators of specialized facilities, the book responds to the need for comprehensive advice on the most rationale and effective ways to manage the greatly increased number of poisoned patients seen throughout the world. Strategies for the prevention of poisoning are also described.

The guidelines draw on the practical experiences of numerous well-established poison centres in different parts of the world. Although recommended lines of action have universal relevance, the book gives particular attention to the situation in developing countries, where a basic infrastructure for the care of poisoned patients is often absent and special problems arise from the lack of adequate communications, transportation, drugs and support services. Throughout, emphasis is placed on the role and functions of a poison information centre as a crucial component of any national programme for poison control.

The book has nine chapters presented in two parts. Part one provides an overview of the policy issues surrounding decisions to introduce measures, including specialized facilities, for the prevention and management of poisoning. Arguing that a poison information centre should be available in every country, part one also describes the benefits of such centres, outlines their principal functions, and suggests various options for their logical and cost-effective operation.

Against this background, part two provides detailed technical advice on how to organize and operate the various facilities and services that make up a comprehensive system for poison control. Separate chapters describe the functions and requirements of information services, clinical services, and analytical toxicological and other laboratory services, and discuss the importance of toxico-vigilance as a strategy for prevention. Subsequent chapters explain how to deal with major emergencies involving toxic chemicals, and outline solutions to the problem, encountered in most developing countries, of obtaining essential antidotes. Part two concludes with advice on the design and content of forms for collecting, storing, and reporting data, followed by a detailed list of the main literature required in a poisons information centre.

Additional practical information is provided in a series of annexes, which describe a computer software system for the management of poisons data, reproduce several model record and reporting forms, and classify a large number of antidotes and related agents according to their proven effectiveness and urgency of availability.

WHO, Distribution and Sales, 1211 Geneva 27, Switzerland.

Guidelines for Poison Control, 1997, xii + 112 pp. (available in English; French and Spanish in preparation) ISBN 92 4 154487 2, CHF35.-/USD31.50, In developing countries: CHF24.50. Order no. 1150439.

Management of Poisoning. A Handbook for Health Care Workers. J.A. Henry & H.M. Wiseman

This handbook provides a practical guide to the emergency management of poisoning in settings, such as the rural areas of developing countries, where doctors are scarce and rapid access to health services is difficult. Addressed to health workers having little or no medical training, the handbook communicates a wealth of information about specific poisons, the signs and symptoms they cause, and the immediate actions to take in order to save lives and minimize complications. While all common causes of poisoning—from natural plant toxins to medicines and household products—are covered, particular attention is given to pesticides as one of the most frequent causes of fatal poisoning in the developing world.

To ensure accuracy and practical utility, the handbook was prepared in consultation with numerous experts and widely field-tested in training workshops prior to finalization. Throughout, illustrations, lists of do's and don'ts, extensive cross-referencing, and a simple nontechnical language are used to facilitate rapid action in emergencies. Recommended treatments are restricted to those that can be safely undertaken by nonmedical personnel with minimum equipment. Medical treatments that require hospital facilities are not included.

The handbook has two parts. The first, which helps prepare health workers to respond to emergencies, opens with basic information about the principal causes of poisoning and the preventive measures that can be taken by households, communities, workers, and their employers. Following a logical and clearly structured approach, subsequent chapters illustrate and explain the exact steps to follow in an emergency. Readers learn how to give first aid, get medical help, examine the patient, determine exactly what happened, and care for patients until they can be seen by a doctor. Part one concludes with a chapter on medicines and equipment, which includes a list of useful medicines and antidotes that can be given by nonmedical workers.

The second and most extensive part serves as a manual for the emergency management of some 70 specific causes of poisoning in four main groups: pesticides, chemicals and chemical products used in the home and the workplace, medicines, and plants, animals, and natural toxins. Each poison is covered according to a common format, which includes information on uses of the substance, how it causes harm, the severity of its effects, signs and symptoms of poisoning, and the exact steps to follow when poisoning occurs. The book concludes with definitions of terms and an extensive index.

WHO, Distribution and Sales, 1211 Geneva 27, Switzerland. *Management of Poisoning, A Handbook for Health Care Workers*, J.A. Henry & H.M. Wiseman, 1997, xiv + 315 pp. (available in English; French and Spanish in preparation), ISBN 92 4154481 3, CHF102.-/USD91.80, In developing countries: CHF71.40, Order no. 1150438.

Press releases from WHO

Starting materials for manufacturing of pharmaceuticals must comply with international standards

The active and inactive starting materials used in the manufacture of pharmaceutical products often change hands many times before reaching the manufacturer of a pharmaceutical product. Along the distribution and trade chain, there are many opportunities for the type and quality of material to change. As a result, chemicals required for the production of pharmaceuticals can become contaminated, resulting in unsafe pharmaceutical products with grave dangers for the patients who use them.

The most often documented example of the above happening is the incorporation of diethylene glycol (DEG) into pharmaceutical preparations. Ingestion of DEG may affect the central nervous system, liver and kidneys, and can lead to death through kidney failure. The latest large-scale, well-documented instance of this happening was in Haiti in 1996, where some one hundred children died after taking contaminated cough syrup, but similar accidents have occurred previously in many countries, resulting in a total of at least 500 unnecessary deaths during the last 10 years.

International action is consequently needed urgently to prevent such accidents in the future and the World Health Organization (WHO) convened a meeting of experts at the WHO headquarters in Geneva from 25 to 27 May 1998 to address this issue. The experts came from 15 countries and represented national drug regulatory authorities, pharmacists' associations, traders, chemical and pharmaceutical manufacturers' associations, international nongovernmental organizations, major pharmacopoeias, consumer organizations and world customs organizations. The meeting formulated several concrete recommendations.

In addressing the experts, WHO Assistant Director-General, Dr Fernando Antezana, underlined that 'the risk is not limited to diethylene glycol, similar incidents may happen at any time with other starting materials if quality assurance is not in place'.

As contamination is most likely to occur either during manufacture of the starting material itself or during its trading, transportation and distribution to the pharmaceutical manufacturer of the final drug product, the group's major recommendations addressed these areas. Manufacturing activities with starting materials for pharmaceutical products should be covered by an authorisation, from the competent health authority, requiring adherence to Good Manufacturing Practice (GMP). Governmental inspectorates should also be able to conduct inspections of manufacturing facilities at any time and place and be able to inspect containers of starting material produced.

Perhaps the major problem is in the transhipment of starting materials. Starting materials often pass through several agents or traders and can be repacked and relabelled at any stage, so that there can be an inaccurate indication of what a container holds by the time it has reached its final destination. To combat this, the group of experts insisted that a system of Good Distribution Practice be installed. Traders and agents should preferably hold an authorisation from the local government. Moreover, national inspectorates should have access to free ports, areas which are exempt from many regulations.

It was recommended that WHO itself should actively develop a list of critical excipients (inactive starting materials) and their nomenclature. This would aid manufacturers, traders, inspectorates and other officials in recognizing and checking the quality of starting materials for pharmaceutical products. Furthermore, the group recommended that each manufacturer or country should have testing facilities for analysis of starting materials and final pharmaceutical products. Where no such analysis is possible, WHO should also advise developing countries to use formulations in essential drugs with ingredients for which they have appropriate testing facilities. Whereas every party in the chain has his own responsibilities, the final responsibility remains with the manufacturer of the final product.

'We have to have safe trading in all starting materials for pharmaceutical manufacturing. There have been repeated catastrophes with diethylene glycol, and now WHO will help develop activities to prevent this happening again,' said Dr Juhana Idänääpn-Heikkilä, Director of WHO's Division of Drug Management and Policies (DMP).

WHO experts re-evaluate health risks from dioxins

Forty specialists from 15 countries met at the headquarters of the World Health Organization (WHO) in Geneva from 25 to 29 May to evaluate the risks which dioxins might cause to health. Since the Seveso incident in 1976, this group of persistent environmental chemicals has consistently grabbed the headlines, although the real effect of these substances is difficult to determine. This group of chemicals includes polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFS) and polychlorinated biphenyls (PCBs), although the most toxic dioxin of all is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). TCDD has been shown to cause dermatological problems, notably chloracne, a chronic and disfiguring skin disease.

These substances are omnipresent in the ground, river beds and air. They are involuntary by-products formed when thermal processes produce chlorine and other organic substances. They can also be produced by volcanic activity, which cannot be controlled, and by forest fires, but the principal controllable sources of dioxin production are waste incinerators.

In recent years, the WHO European Centre for Environmental and Health (WHOECEH) has been coordinating a comprehensive programme, in collaboration with the International Programme on Chemical Safety (IPCS) on PCDDS, PCDFs and PCBS, to evaluate the possible health risk, as well as methods of prevention and control of environmental exposure of the general population to these chemicals.

During a previous meeting on dioxins, held at Bilthoven, in the Netherlands, in 1990, WHO experts established a tolerable daily intake of 10 pg/kg body weight for TCDD, said to be the most toxic dioxin. (One picogram, pg, equals a millionth of a millionth of a gram).

Since then, new epidemiological data has emerged, notably concerning dioxins' effects on neurological development and the endocrine system, and WHO thus convened the consultation which has just taken place in Geneva to re-evaluate the tolerable daily dose of dioxins to which a human can be exposed. After ample debate, the specialists agreed on a new tolerable daily intake range of 1–4 pg/kg body weight. The experts, however, recognized that subtle effects may already occur in the general population in developed countries at current background levels of 2–6 pg/kg body weight. They therefore recommended that every effort should be made to reduce exposure to the lowest possible level.

The background documents for the experts' meeting discussed carcinogenic and noncarcinogenic effects of dioxins on humans and animals, the risks for young children, transmission mechanisms, general exposure to dioxins and the compounds of the same nature, as well as current means of evaluating these risks in different countries.

'Recent exposure data show that measures introduced to control dioxin release in a number of countries have resulted in a substantial reduction in intake of these compounds in the past few years', emphasized Dr Maged Younes, Chief of the Assessment of Risk and Methodology unit in the WHO Programme for the Promotion of Chemical Safety. 'This is evidenced by a marked decrease in dioxin levels in human milk, as found in an exposure study conducted by the WHO European Centre for Environment and Health, with the highest rates of decrease being observed in areas which had the highest initial concentrations.'

Tenth WHO Model List Of Essential Drugs

A World Health Assembly Report of 1975 recognized the urgent problems of lack of essential drugs in many countries, and provided the impetus for the first WHO Model List of Essential Drugs, published in 1977. Since that time, the concept of essential drugs has been widely applied. It has provided a regional basis not only for drug procurement at national level but also for establishing drug requirements at various levels within the health care system.

Essential drugs are those that satisfy the health care needs of the majority of the population and should therefore be available at all times in adequate amounts and in the appropriate dosage forms. This definition remains as valid today as it was 20 years ago.

The choice of such drugs depends on many factors, such as the pattern of prevalent diseases; treatment facilities; training and experience of the available health care personnel; financial resources; as well as genetic, demographic and environmental factors.

Since 1975, there have been nine reports in total, each one updating and improving the list and providing guidelines on selection and use. Because of differing views on the definition of an essential drug in terms of what is meant by the 'health care needs of the majority', the list has been gradually expanded since its introduction and has evolved with changing health needs and therapeutic options.

Over the 20 years, 166 new drugs have been added while 68 drugs have been deleted, resulting in an overall increase from the original 208 to 306 drugs after the last Expert Committee meeting, which took place in December 1997.

Each selected drug must be available in a form in which adequate quality can be assured and its stability under the anticipated conditions of storage and use must be verified.

Where two or more drugs appear to be similar in the above respect, the choice between them should be

made on the basis of a careful evaluation of their relative efficacy, safety, quality, price and availability.

The WHO List of Essential Drugs is a model, to guide countries and health services in developing their own national and local lists. Such lists should be evidence based, considering prevalent diseases, treatment facilities, training and experience of health personnel, financial resources, genetic factors and demographic factors.

The concept of essential drugs has been disseminated and promoted extensively at the country level by WHO's Action Programme on Essential Drugs, as well as by disease control programmes in WHO, international and nongovernmental organizations throughout the world and bilateral agencies.

Over the last 20 years the WHO Model List has proven to be an invaluable tool for saving lives and improving health through more rational use of drugs, wider access to drugs, and improved drug quality.

In the preparation of the Tenth WHO Model List of Essential Drugs which was recently published in *WHO Drug Information*, Vol. 12, No. 1, priorities were to 'fine tune' the list in the light of the latest evidence, to correct any major omissions and to address drug treatment issues for some of the major health priorities today, including the problem of antibiotic resistance, asthma and diabetes.

One important advance in the new Model List is the addition of a new drug, triclabendazole, for the treatment of liver and lung flukes. This illustrates the way the List can be used to highlight a therapeutic need and speed up availability of new drug treatment.

AIDS treatment was also addressed and zidovudine (AZT) has now been introduced into the WHO Model List of Essential Drugs for the specific treatment of HIV-infected pregnant women in order to reduce mother-to-child transmission and to protect the new-born baby.

A further note on triple therapy in HIV/AIDS was also included to the effect that it was a new therapy beyond the budgets of most National Drug Programmes and must be decided at country or institutional level. However, several drugs were added for the treatment of opportunistic infections.

The WHO Model List of Essential Drugs is considered to be as an informational and educational tool for professionals and consumers. Since concern about health care costs is now a priority even in developed countries, the Model List is of greater importance than ever as an aid to developing treatment guidelines, national formularies, consumer drug information, and other measures to improve drug use.

The List also serves as the basis for WHO model drug information, a new model formulary, and basic drug quality tests.

The List should be seen in the context of national drug policies that address not only drug use, but also procurement and supply strategies, drug financing, drug donations, and research priorities.

Major gaps in research on antibiotic resistance need filling

Fluoroquinolones are important members of the quinolone group of antibiotics which are licensed to treat diseases in humans and animals. However, their use in livestock animals can contribute to increased resistance in food-borne bacteria (such as *Campylobacter* and *Salmonella*) which may infect humans. Fluoroquinolones are important for the treatment of invasive *Salmonella* and *Campylobacter* infections in humans and an increase in the resistance in these bacteria is therefore of concern.

'To date, there has been little documented impact on human health of fluoroquinolone use in livestock, but there is concern over the potential human health consequences if resistance were to increase and spread. Further research and data gathering are thus essential,' said Dr David Heymann, Director of the World Health Organization's (WHO) Division of Emerging and other Communicable Diseases Surveillance and Control (EMC).

Consequently, the WHO convened a meeting on the medical impact of quinolone use in food animals at WHO headquarters in Geneva from 2 to 5 June. The meeting, in which over 60 experts from both the human and animal health fields participated, agreed that that major emphases of future research should include: determining the full extent of quinolone usage outside human medicine; improving epidemiological evidence on how resistance in both animals and humans develops, persists and spreads between animal species and humans; developing surveillance techniques specifically designed to capture the above data; determining the mechanisms and levels of resistance in important zoonotic pathogens to quinolones and how important these resistance levels are in terms of human health risk; developing strategies for prudent use in animals to maximize therapeutic benefit while minimizing development of resistance; developing alternatives, such as vaccines, to the use of antimicrobials for animal disease prevention.

Following the introduction of fluoroquinolones in several countries, *Salmonella* with reduced susceptibility to fluoroquinolones have emerged in food animals; resistant *Campylobacter* have also emerged. Although no human cases have been documented, the experts expressed concern that there could be treatment failures in humans infected with *Salmonella* with reduced susceptibility. The experts also noted that, with the use of fluoroquinolones in humans, human pathogens have

begun to develop resistant strains and there are now several circumstances in which resistance has limited the therapeutic use of this class of antibiotic for important diseases such as for gonorrhoea and typhoid.

While fluoroquinolones are not used as growth promoters, they are currently used for treatment of animal disease in many countries of the world and, in some regions, they are also used for disease prevention in animals. However, the data available so far on their usage are scarce and are often the proprietary information of the drugs' manufacturers. Consequently, correlations between quinolone usage and the emergence of resistance are hard to make. WHO and the meeting's participants welcomed the initiative by COMISA (the World Federation of the Animal Health Industry) at the 2–5 June meeting that provided sales and volume data for the major fluoroquinolones in more than 30 countries.

The experts, from 18 countries, requested that WHO, in conjunction with the Food and Agriculture Organization of the United Nations (FAO) and the Office International des Epizooties (OIE—the World Organization for Animal Health), work together to gather data, standardise testing methods and develop a code of practice for the prudent use of antimicrobials in food animals. WHO should also, the participants agreed, ensure that public health safeguards are given prominence in such a code of practice.

All WHO Press Releases, Fact Sheets and Features as well as other information on these subjects can be obtained on Internet on the WHO Home Page. URL: http://www.who.int/

Conference announcements

IUPAC Congress, 14–19 August 1999, Berlin, Germany

Invitation

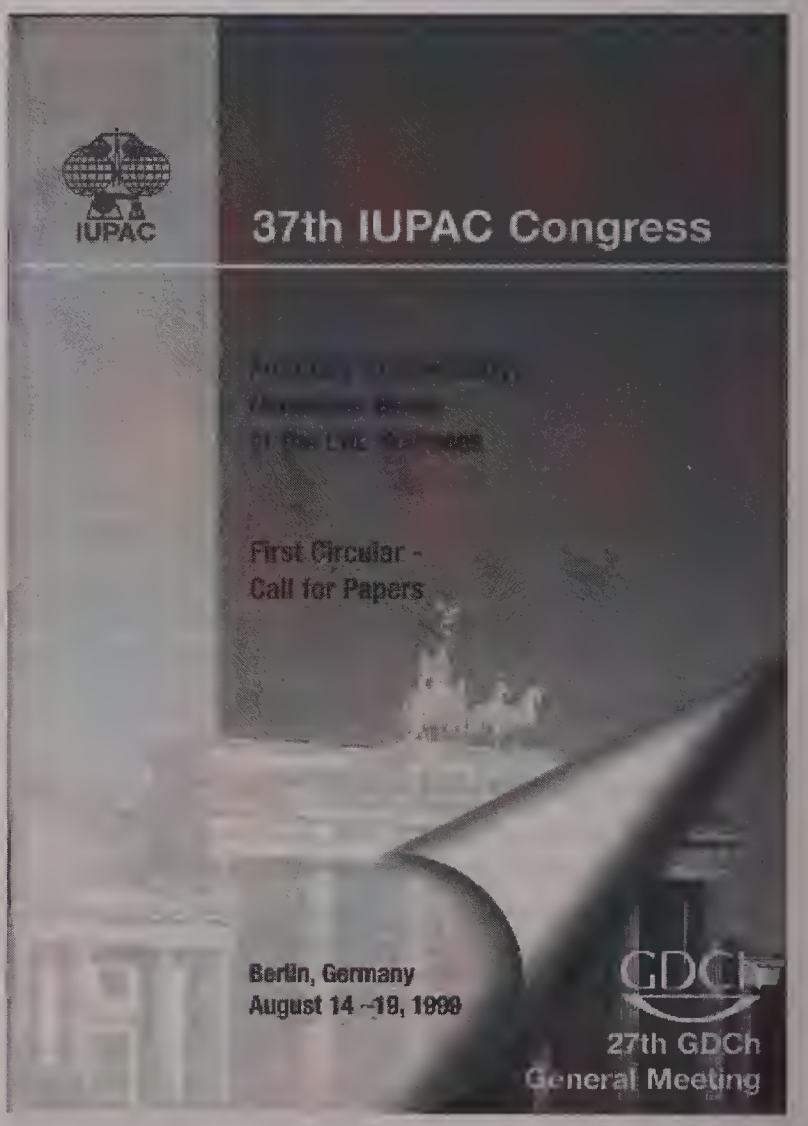
The 37th IUPAC Congress will be held in Berlin (Germany) from Saturday 14th August to Thursday 19th August 1999. On behalf of the German Chemical Society GDCh (Gesellschaft Deutscher Chemiker), the International Advisory Board and the National Scientific Committee it is a great pleasure for us to invite colleagues and advanced students from chemistry, biochemistry and from other areas of molecular sciences to attend this important event in the closing days of this century. It is an honour for the German Chemical Society to host the IUPAC Congress in the year 1999, the fiftieth anniversary of the post-war renaissance of our learned society which was originally founded in 1867.

IUPAC has redefined the scope and the format of the prestigious biennial Congress with the goal to constitute a central international event in the world of chemical research, to present outstanding developments and to inspire high standards of excellence. To achieve this a focus on an especially important and developing field is required.

The 37th IUPAC Congress will be the first to be organized according to the new statutes and will provide a focus on highly important interdisciplinary aspects under the title:

> Frontiers in Chemistry: Molecular Basis of the Life Sciences.

We will thus provide an outstanding opportunity for scientists from academia and industry from all parts of



the world to get up-to-date information, to present their work and to exchange ideas about the scientific challenges and possible industrial innovations for the upcoming century.

The circular defines the scope of the scientific program and the reputation of plenary, keynote and invited

lecturers will guarantee outstanding quality. Our aim is to bring together distinguished experts and enthusiastic young scientists, experienced researchers from different scientific areas and professionals from chemical and life science companies. Ample time and space will be provided for oral contributions and posters, which will allow you to present your relevant results to an international audience.

The Congress will start just after the IUPAC General Assembly, held at the Free University of Berlin. Parallel to the 37th IUPAC Congress, the 27th General Meeting of the German Chemical Society will also take place, in which further areas of chemistry will be presented. A number of special symposia in cooperation with other European chemical societies will be organized in the frame of this double event, some of which are obviously related to the theme of the Congress; here, too, poster contributions are welcome.

Last but not least this double event, Congress and GDCh General Meeting, should inspire the young generation of chemists. There will be special program features organized by the GDCh Younger Chemists Forum in cooperation with young chemists from many other countries.

The IUPAC Congress and the other parallel events outlined above will be held at the International Congress Center of Berlin, not far from the western centre. Berlin is a city undergoing dramatic change since the German reunification and is a treasure chest of culture (three opera houses, art collections of world renown) and a good starting point for excursions.

We want to repeat our invitation to all scientists and we look forward to meeting you in Berlin during the sunny summer days in August 1999.

Prof. Dr J. Jortner, President of the International Union of Pure and Applied Chemistry, Dr E. Meyer-Galow, President of the German Chemical Society, Prof. Dr R. Huber, Chairman of the International Advisory Board, Prof. Dr E. Winterfeldt, Chairman of the National Scientific Committee

For further information contact: Gesellschaft Deutscher Chemiker, IUPAC 99, PO Box 90 04 40, D-60444 Frankfurt-am-Main, Germany, Tel.: + 49 69 7917358, Fax: + 49 69 7917475, e-mail: tg@gdch.de, Home Page: http://www.gdch/de

IUPAC General Assembly, 7–14 August 1999, Berlin, Germany

This biennial meeting will host the meetings of IUPAC bodies as well as the executive and policy making bodies of the Unions, the Bureau and Council. The meeting will be held at the Free University of Berlin. Schedules and other information will be distributed to National Adhering Organizations and all members of IUPAC bodies later in 1998.

Advanced Materials, 15–17 July 1999, Hong Kong

This is the first Workshop of the new IUPAC series: 'New Directions in Chemistry'. The 1st IUPAC Workshop on Advanced Materials: Nanostructured Systems (IUPAC-WAM-1) will be held on the campus of the Hong Kong University for Science and Technology from 15 to 17 July 1999. The Philosophy of the series is to foster interaction among active scientists from different parts of the world with similar interests in new research area of chemistry. The scientific program will cover Theory, Nanoparticles, Quantum Dots and Quantum Wells, Nanotubes, Nanowires and Nanorods, Self assembly, Bio-inspired structures, Applications to Nanotechnology. Each session will include plenary and invited lectures, and contributed papers (oral and poster).

Organizing Committee: Prof. M. A. El-Sayed, Georgia Tech, Atlanta, GA, USA, *Chairman*; Prof. Joshua Jortner, President IUPAC, Tel Aviv U., Israel, *Honorary Chair*; Prof. Nai Teng Yu, HKUST, Hong Kong, *Chairman of Local Organizing Committee*; Dr. Stan Williams, Hewlett-Packard Co., California, USA, *Chairman of Program Committee*; and Dr. Clemens Burda, Georgia Tech, Atlanta, GA, USA, *Secretary*.

Please visit http://www.iupac.org/symposia/conferences/wam1 for further information, or contact Professor M. A. El-Sayed, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA 30332-0400, USA. Tel.: +1 404-894-0292, fax: +1 404-894-0294, e-mail: mostafa.el-sayed@chemistry.gatech.edu.

IUPAC–ISO/REMCO–BAM–EUROLAB-D Workshop on proper use of environmental matrix reference materials. 22–23 April 1999, Berlin, Germany

Natural matrix reference materials represent a specific group of reference materials. The characterization and certification of these materials is fraught with many complex problems related to traceability and uncertainty of the assigned values. These materials are, due to variety of reasons, often misused in the analytical process.

The aim of the workshop is to build up the awareness of the RM users' about how various types of RM should be utilized. Representatives from various reference material producing organizations will present how they expect analysts to employ their respective reference materials.

Participation of representatives from BAM, IAEA, IRMM, NIST, NIMCR, NRCCRM, and some other RM producing organizations is foreseen. The Workshop will include also lectures related to the ISO Guide 33, Database COMAR and the activities of ISO/REMCO.

The Workshop will consist of lectures presented by the invited experts followed by immediate discussion and a general discussion related to the users' needs and new strategies in characterization and certification of natural matrix reference materials. (Due to technical reasons, the number of participants will be limited to 150.)

For further information, please contact: EUROLAB-D, Gudrun Neumann, D-12200 Berlin, Tel.: +49 30 81 04 37 69, Fax: +49 30 81 04 37 17, e-mail: Gudrun.Neumann@bam.de

Biodiversity and Bioresoures, 11–15 July 1999, Belo Horizonte, Minas Gerais, Brazil

II International Conference on Biodiversity and Bioresources—Conservation and Utilization,

Prof. Alaide Braga de Oliveira, Faculdade de Farmacia–UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte, Brazil, Fax: + 55 31 337 9076, e-mail: fernao@dedalus.lcc.ufmg.br

The purpose of the conference is to bring together scientists from all over the world to discuss and excnage their ideas on how chemistry, biology, biotechnology and related fields might further enhance the possibility of conservation and utilization of biodiversity.

2000, Warsaw, Poland

13th International Conference on Organic Synthesis (ICOS-13).

The 13th Conference in this series will emphasize the creative aspects of modern organic synthesis.

Prof. M. Chmielewski, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, PO Box 58, Poland, Tel.: + 48 22 6318788, Fax: + 48 22 6326681, E-mail: icho-s@ichf.edu.pl

Polymers In Medicine, 17–20 July 2000, Prague, Czech Republic

40th Microsymposium Polymers in Medicine

The Symposium will provide a forum for experts from academia and industry specializing in various aspects of biomedical materials. The primary objective is to provide an interdisciplinary forum for the discussion of the relationship between the structure of biorecognizable systems on one hand and their physicochemical and biological properties on the other. The pros and cons of treaditional synthetic pathways and genetically engineered materials will be evaluated.

Topics will include:

1 Tailor-made synthesis of biorecognizable polymers
2 Structural factors influencing the interaction of macromolecules with receptors/antigens
3 Soluble and vesicular drug delivery systems
4 Genetically engineered biomedical polymers and biomaterials.

Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Science of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic, Tel.: +420 2 360 341, Fax: +420 2 367 981, e-mail: sympo@imc.cas.cz

Organo-metallic Chemistry, 18–22 July 1999, Versailles, France.

10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10)

The aims of the symposium are the presentation of recent results, the discussion of trends and the exchange of ideas relating to the use of metals in organic synthesis.

OMCOS 10 will include the following topics:

- Asymmetric Synthesis via Organometallics;
- Structural & Mechanistic Aspects related to Synthesis;
- Metal-Organics in Materials Research;
- Catalytic Processes Involving Organometallics;
- New C–C and C-Heteroatom Bond Forming Processes via Metals;
- Cyclizations/Ring-opening reactions Involving Organometallics.

Prof. J.P. Genet. Laboratoire de Synthese Selective Organique et Produits Naturels, ENSCP–UMR CNRS 7573, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France, Tel.: +33 1 44 27 67 43, Fax: +33 1 44 07 10 62, e-mail: genet@ext.jussieu.fr

Obituary

Prof. Dr. mult. Viktor Gutmann, Professor Emeritus of the Technical University Vienna, Secretary of the Inorganic Division of IUPAC from 1959 to 1967, Vice President from 1969 to 1973, and President of the Inorganic Division from 1973 to 1975 died on 16 July 1998 at the age of 77.

Conference Calendar

Visit http://www.iupac.org for complete information and further links

1998

Medicinal Chemistry

6–10 September 1998
XVth International Symposium on Medicinal Chemistry, Edinburgh, Scotland, UK.
Dr J.F. Gibson, The Royal Society of Chemistry, Burlington House, London, W1V 0BN, UK. Tel.: +44 171 437 8656/440 3321, fax: +44 171 734 1227.

Electrochemistry

13–18 September 1998
49th Annual Meeting of the International Society of Electrochemistry, Kitakyushu, Japan.
Prof. Rika Hagiwara. Department of Fundamental Energy Science, Graduate School of Energy Science, Kyoto University, Sakyo-ku, Kyoto 606, Japan. Tel.: +81 75 753 5822, fax: +81 75 753 5906, e-mail: ise@g-chem.nucleng.kyoto-u.ac.jp

Chemistry of germanium, tin and lead

20–25 September 1998
9th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin & Lead (ICCOC GTL-9), Melbourne, Australia.
Prof. Dainis Dakternieks, School of Biological & Chemical Sciences, Deakin University, Geelong 3217, Australia. Tel.: +61 3 52 271318, fax: +61 3 52 271040, e-mail: dainis@deakin.edu.au

Supramolecular science and technology

27 September–3 October 1998
1st International Conference on Supramolecular Science & Technology, Zakopane, Poland.
Prof. Marek Pietraszkiewicz, Chairman, Institute of Physical Chemistry, ul. Kaspazaka 44/52, 01-224 Warsaw, Poland. Tel.: +48 22 632 3221 (ext. 3226), fax: +48 39 12 0238, e-mail: pietrasz@ichf.edu.pl

Chemistry of natural products

11–16 October 1998
21st IUPAC symposium on the Chemistry of Natural Products, Beijing, China.
Prof. Xiaotian Liang, Chairman, Prof. Xibai Qiu, Secretary, c/o Chinese Chemical Society, PO Box 2709, Bejing 100080, China. Tel./fax: +86 10 625 68157, e-mail: qiuxb@infoc3.icas.ac.cn

Excitonic processes in condensed matter

2–5 November 1998
Third International Conference on Excitonic Processes in Condensed Matter, Boston, MA, USA.
Prof. William M. Yen, Department of Physics and Astronomy, University of Georgia, Athens, GA 30602-2451, USA. Tel.: +1 706 542 2491, fax: +1 706 542 2492, e-mail: wyen@hal.physast.uga.edu

Cuban Chemical Society

1-4 December 1998
III International Congress Cuban Chemical Society, Havana, Cuba.
Prof. Alberto J. Nunez Selles, Sociedad Cubana de Quimica, Ave 21 & 200, Atabey Apdo 16042, CP 11600 Havana, Cuba. Tel.: +537 218 178, fax: +537 336 471, e-mail: cqf@infomed.sld.cu

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes, Osaka, Japan.
Prof. Yasuhiko Shirota, Faculty of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan. Tel.: +81 6 879 7364, fax: +81 6 877 7367, e-mail: isfd@chem.eng.osaka-u.ac.jp

Polymer systems

7 –10 June 1999
3rd International Symposium on Molecular Mobility and Order in *Polymer Systems, St. Petersburg, Russia.Symposium Chairman: Prof. A.A. Darinskii, Symposium Coordinator: Mrs I. Kovalenko, Institute of Macromolecular Coumpounds, Bolshoy pr. 31, St. Petersburg, 199004 Russia. Tel.: +812 213 2907, fax: +812 218 6869, e-mail: IMC@macro.spb.su*

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: +254 2 521003, fax: +254 2 520023, e-mail: p.sanchez@cgnet.com

Memorial K.I. Zamaraev

28 June–2 July 1999
International Memorial K.I. Zamaraev Conference on Physical Methods for Catalytic research at

the Molecular Level, Novosibirsk, Russia.
Prof. V.N. Parmon, Boreskov Institute of Catalysis, 5, Prosp. Akad. Lavrentieva, Novosibirsk, 630090, Russia. Tel.: +7 3832 343269, fax: +7 3832 343056, e-mail: parmon@catalysis.nsk.su

Biodiversity and Bioresources

New dates

11–15 July 1999
2nd International Conference on Biodiversity and Bioresources—Conservation and Utilization, Belo Horizonte, Minas Gerais, Brazil.
Prof. Alaide Braga de Oliveira, Faculdade de Farmacia—UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte, Brazil. Fax: +55 31 337 9076, e-mail: fernao@dedalus.lcc.ufmg.br

Polymerization methods

12–15 July 1999
39th Microsymposium, Advances in Polymerization Methods: Controlled Synthesis of Functionalized Polymers, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Advanced materials

15–17 July 1999
1st IUPAC Workshop on New Directions in Chemistry. Workshop on Advanced Materials: Nanostructured Systems (IUPAC-WAM-1), Hong Kong. Professor M.A. El-Sayed, School of Chemistry and Biochemistry, Georgia Institute of Technology Atlanta, GA 30332-0400, USA. Tel.: +1 404 894 0292, fax: +1 404 894 0294, e-mail: mostafa.el-sayed@chemistry.gatech.edu

Organo-metallic Chemistry

18–22 July 1999
10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10), Versailles, France.
Prof. J.P. Genet, Laboratoire de Synthese Selective Organique et Produits Naturels, E.N.S.C.P.—UMR CNRS 7573, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France. Tel.: +33 1 44 276743, fax: +33 1 44 071062, e-mail: genet@ext.jussieu.fr

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. Fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Kyoto University, Kyoto 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911,e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium (SAC 99), Dublin, Ireland.
Prof. Malcolm R. Smyth, Faculty of Science, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 704 5308, fax: +353 1 704 5503, e-mail: smythm@dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777, fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

IUPAC General Assembly

6–13 August 1999
Frontiers in Chemistry: Molecular Basis of the Life Sciences, Berlin, Germany.
IUPAC Secretariat. Tel.: +1 919 485 8700, fax: +1 919 485 8706, e-mail: secretariat@iupac.org

How to apply for IUPAC sponsorship

To apply for IUPAC sponsorship, conference organizers should complete an Advanced Information Questionnaire (AIQ). The AIQ form is available at http://www.iupac.org or by request at the IUPAC Secretariat, and should be returned between 2 years and 12 months before the conference. Further information on granting sponsorship is included in the AIQ and available on line

IUPAC Congress

14–19 August 1999
Berlin, Germany.
Gesellschaft Deutscher Chemiker–GDCh, PO Box 90 04 40, 60444 Frankfurt Am Main, Germany. Tel.: +49 69 7917 358/360/366, fax: +49 69 7917 475, e-mail: tg@gdch.de

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MMC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169-50, Japan. Tel.: +81 3 5286 3120, fax: +81 3 3209 5522, e-mail: w169988@mn.waseda.ac.jp

2000

Bio-organic chemistry

February 2000
5th IUPAC Symposium on Bio-Organic Chemistry (ISBOC-V), New Delhi, India.
Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 471 491 459, fax: +91 471 490 186.

High temperature materials chemistry

4–10 April 2000
10th International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), 52425 Jülich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Organic Synthesis

1–5 July 2000
13th International Conference on Organic Synthesis (ICOS-13), Warsaw, Poland.
Prof. M. Chmielewski, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, PO Box 58, Poland. Tel.: +48 22 631 8788, fax: +48 22 632 6681, e-mail: ichos@ichf.edu.pl

Macromolecules

9–14 July 2000
38th International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Prof. Stanislaw Penczek, Polish Academy of Sciences, ul. Sienkiewicza 112, 90363 Lodz, Poland. Tel.: +48 42 81 9815, fax: +48 42 684 7126, e-mail: spenczek@bilbo.cbmm.lodz.pl

Coordination Chemistry

9–14 July 2000
34th International Conference on Coordination Chemistry (34-ICCC), Edinburgh, Scotland.
Prof. P. Tasker, Chairman, Dr John F. Gibson, Secretary, The Royal Society of Chemistry, Burlington House, London W1V OBN, UK, Tel.: +44 171 440 3321, fax: +44 171 734 1227, e-mail: gibsonj@rsc.org

Polymers In Medicine

17–20 July 2000
40th Microsymposium Polymers In Medicine, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Science of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2360341, fax: +420 2367981, e-mail: sympo@imc.cas.cz

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on Chemical Thermodynamics, Halifax, Nova Scotia, Canada.
Dr Peter G. Kusalik, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia B3H 4J3, Canada. Tel.: +1 902 494 3627, fax: +1 902 494 1310. e-mail: kusalik@is.dal.ca

Natural products

1 September 2000
22nd International Symposium on the Chemistry of Natural Products, Sao Paulo, Brazil.
Dr M. Fátima das G.F. da Silva, Universidade Federal de Sao Carlos, Depto. de Quimica, Via Washington Luiz, km 235, CP676, Sao Carlos, Brazil. Tel.: +55 16 274 8208, fax: +55 16 274 8350, e-mail: dmfs@power.ufscar.br

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV—c/o 11th IBS, Theodor-Heuss-Allee 25, 60486 Frankfurt/Main, Germany. Tel.: +49 69 7564 205, fax: +49 69 7564 201, e-mail: info@dechema.de

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

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PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Tel.: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org http://www.iupac.org

The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary non-governmental, non-profit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

- to promote continuing co-operation among the chemists of the member countries
- to study topics of international importance to pure and applied chemistry which need standardization, or codification
- to co-operate with other international organizations which deal with topics of a chemical nature
- to contribute to the advancement and understanding of pure and applied chemistry in all its aspects

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

National Adhering Organizations

Academy of Scientific Research and Technology **(Arab Republic of Egypt)**
Asociación Química Argentina **(Argentina)**
Australian Academy of Science **(Australia)**
Ôsterreichische Akademie der Wissenschaften **(Austria)**
Nationaal Comité voor Scheikunde/Comité National de Chimie **(Belgium)**
Brazilian Chemistry Committee for IUPAC **(Brazil)**
National Research Council of Canada **(Canada)**
Sociedad Chilena de Química **(Chile)**
Chinese Chemical Society, Beijing and Chemical Society located in Taipei **(China)**
Croatian Chemical Society **(Croatia)**
Czech National Committee for Chemistry **(Czech Republic)**
Det Kongelige Danske Videnskabernes Selskab **(Denmark)**
Deutscher Zentralausschuss für Chemie **(Federal Republic of Germany)**
Suomen Kemian Seura **(Finland)**
Comité National Français de la Chimie **(France)**
Association of Greek Chemists **(Greece)**
Hungarian Academy of Sciences **(Hungary)**
Indian National Science Academy **(India)**
Royal Irish Academy **(Ireland)**
Israel Academy of Sciences and Humanities **(Israel)**
Consiglio Nazionale delle Ricerche **(Italy)**
Science Council of Japan **(Japan)**
Kuwait Chemical Society **(Kuwait)**
Koninkliijke Nederlandse Chemische Vereniging **(Netherlands)**
Royal Society of New Zealand **(New Zealand)**
Norsk Kjemisk Selskap **(Norway)**
Chemical Society of Pakistan **(Pakistan)**
Polska Akademia Nauk **(Poland)**
Sociedade Portuguesa de Quimica **(Portugal)**
Colegio de Químicos de Puetro Rico **(Puerto Rico)**
Korean Chemical Society **(Republic of Korea)**
Foundation for Research Development **(Republic of South Africa)**
Russian Academy of Sciences **(Russia)**
King Adbulaziz City for Science and Technology **(Saudi Arabia)**
Slovak National Committee for Chemistry **(Slovakia)**
Slovenian Chemical Society **(Slovenia)**
Comisión Interministerial de Ciencias y Tecnología **(Spain)**
Svenska Nationalkommittén för Kemi **(Sweden)**
Neue Schweizerische Chemische Gesellschaft **(Switzerland)**
Royal Society **(United Kingdom)**
National Research Council, National Academy of Sciences **(USA)**
Union of Yugoslav Chemical Societies

Chemistry International

IUPAC

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Blackwell Science

0193-6484(199809)20:5;1-S

Printed in Great Britain by Alden, Oxford

ISSN 0193-6484

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

IUPAC

1998, Vol. 20, No. 6 (November)

Blackwell Science

Chemistry International

The news magazine of the International Union of Pure and Applied Chemistry (IUPAC)

PRODUCTION EDITOR: Howard Waller

All correspondence to be addressed to The Editor, Chemistry International, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA. Telephone: +1 (919) 485 8700. Fax: +1 (919) 485 8706. E-mail: secretariat@iupac.org and http://www.iupac.org

Subscriptions

Six issues of *Chemistry International* will be published bimonthly in 1998 (one volume per annum) in January, March, May, July, September and November. The 1998 subscription rate including postage is GBP 75.00 (UK and overseas except North America) or USD 116.00 (US and Canada). The individual subscription rate is GBP 29.00 (UK and overseas except North America) or USD 42.00 (US and Canada). Microfiche subscriptions are available simultaneously with the printed edition, and microfilm at the end of the subscription year. Subscription orders may be placed directly with IUPAC's official publisher, Blackwell Science Ltd, PO Box 88, Oxford, UK; E-mail: journals.cs@blacksci.co.uk. Information on this journal can be accessed at http://www.blackwell-science.com/products/journals/chem.htm

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Front cover: Delegates at the opening ceremony, 7ICCA. For details see p. 172.

International Union of Pure and Applied Chemistry

News from IUPAC

IUPAC moves to a project-driven system

The organization and management of IUPAC's scientific work will soon begin a transition to a system that emphasizes individual projects, rather than the allocation of Titular Members among a large number of Commissions and Committees. By a vote of 20–0, with two abstentions, the Bureau has approved an integrated programme proposed by the Strategy Development and Implementation Committee (SDIC) and the Committee on Project Evaluation Criteria (CPEC) that will: (i) assign to greatly strengthened Division Committees the primary responsibility for overseeing the initiation, approval and management of scientific projects, and (ii) establish a uniform procedure for evaluating and funding such projects. Some aspects of the new programme will begin immediately, but there will be a gradual phase-in over the next three years, as Division Committees, Commissions and other IUPAC bodies develop plans for long-range implementation of the new system, as well as proposals for specific new projects.

Changes in the organization and management of IUPAC's scientific work

To meet the challenges occurring world-wide in chemistry and the chemical industry, IUPAC has developed a Strategic Plan to redefine its role as the international organization principally responsible for the promotion of the Chemical Sciences. This plan provides guidelines for the Union to respond to the globalization of science, to the expansion of the borders of chemistry in a wide range of scientific fields, to the interdisciplinary nature of modern chemistry and to the service of chemistry to society. The Strategic Plan articulates the policy of the Union and provides general guidance to our operating arms, the Divisions and the Standing Committees.

The present structure of the Union precludes the fulfilment of many of its central scientific functions, as reflected in organizational fragmentation and resulting hindrance in the inception and conduct of horizontal interdisciplinary projects. The founders of IUPAC envisioned and made provision for the organization and action of a dynamic Union. In time, the concept of a changing structure was replaced by the current system of long-term Commissions, with little opportunity for Divisions to plan for scientific renewal and growth. Significant past attempts for the restructuring of IUPAC by the creation of the Pool Titular Members and by the interdisciplinary unification of Divisional activities have not been effective. IUPAC must build on past successes but must aim toward its future accomplishments, impact and image.

The Bureau has now approved a policy and an operational programme based on the conceptual framework that the Union represents and serves the entire world chemistry community. The objective is to improve the quality, relevance, international impact and effectiveness of the Union's scientific work. The integrated programme constitutes a holistic plan, which rests on major changes in the responsibilities of the Division Presidents and Division Committees, in the election procedures on a Division level, in project evaluation, and in the future function of the Commissions.

I would like to articulate explicitly and clearly that these changes are aimed at the enhancement of IUPAC's future contributions and impact, and do not in any way question the accomplishments and dedication of IUPAC's bodies and of the eminent scientists who have collectively contributed, over the decades, to the Union's reputation.

I am delighted that the Bureau has approved the integrated programme, some elements of which will begin immediately. To implement the programme, we will consult closely with our National Adhering Organizations, which collectively constitute the ultimate authority of the Union and are in turn accountable for the public and scientific resources used by all IUPAC bodies. The newly approved programme will shape IUPAC's role towards the 21st century

Professor Joshua Jortner
President, IUPAC

The programme approved by the Bureau is designed to give clear direction for the Union to

- revitalize its scientific activities,
- ensure the selection of only high quality projects to bear the IUPAC label,
- encourage participation by the world-wide chemistry community,
- optimize the use of IUPAC's limited financial resources, and
- simplify management and accountability.

There are five principal components of the new programme:

1 The Union will gradually replace its long-time practice of allocating resources by the assignment of Titular Members to Commissions and Committees, with a system in which funds are directly allocated to carry out approved projects. The purpose of the change is to ensure that high priority projects are adequately funded and can be started and completed as expeditiously as is feasible. Uniform IUPAC-wide procedures will be implemented by January 1999 to evaluate proposed projects for quality and suitability, and to fund them within individual Divisions or from central IUPAC funds. Generally, each project will be carried out by a limited-term Task Group. The new system is designed to simplify management, reduce bureaucratic rules and clarify accountability. The Executive Summary of the report by the Committee on Project Evaluation Criteria can found on page 167.

2 Division Committees have been given the responsibility for seeking out ideas for projects, evaluating proposals and managing approved projects. The Division Committees will be strengthened by new procedures for the nomination of their Members. The Bureau has given approval, effective immediately, for an interim modification of Division Committees as needed to ensure necessary expertise and breadth. Over the next three years, existing Commissions are expected to continue to provide the primary source of new projects, but efforts will start immediately to solicit ideas and interested participants for new Task Groups from the world-wide chemistry community.

3 Beginning in 2002, there will be a major redistribution of funds, with increases in Division budgets, the establishment of a central pool of money to support interdisciplinary projects and projects that require resources beyond the scope of an individual Division or Standing Committee, and the termination of separate budgets for the General Assemblies. Council will be asked to amend Bylaw 4.307, which currently describes the 'right' of Titular Members to receive travel reimbursements, irrespective of responsibility for projects or other activities.

4 The role of Commissions will change drastically beginning in 2002. As an initial step, Council will be asked in 1999 to exercise its responsibility under Bylaw 4.302 to decide not to continue any existing Commission beyond the end of 2001. This action will permit each Division Committee to utilize the period 1999–2001 to take a fresh look at its overall programmes, to consider how best to allocate its resources, and to determine the optimum way to provide for oversight of activities and continuity of programmes. During this period (and thereafter) if a Division Committee believes that a new Commission is needed for a particular purpose, it may request the Bureau and Council to form such a Commission by making a persuasive case under the procedures of Bylaw 4.301, including specification of the life of the proposed Commission. Such a Commission might be established, for example, to generate a long-term strategy and develop IUPAC's role in a new area or to accomplish an important short-term task. Funding will be provided as needed to accomplish the objectives.

5 After 2002, it is anticipated that there will be a substantial reduction in the number of Commissions and a significant increase in the number of short-term Task Groups. These changes will require reconsideration of the 'membership' of the Divisions—currently defined in the Bylaws as the Titular and Associate Members of Commissions and Division Committees. The Secretary General and Division Presidents have been charged by the Bureau to develop proposals that could be acted on by Council in 2001. In addition, the role of National Representatives will be re-examined. The plan approved by the Bureau includes provision for a limited number of nonvoting National Representatives on Division Committees, but additional mechanisms are to be developed to enhance participation by a large number of scientists from both large and small countries.

Secretary General's Report

Edwin D. Becker

As reported in the article on pp. 163, the IUPAC Bureau has approved a policy that will phase in major changes in the organization and management of our scientific work. In this column I would like to provide some information on the discussions that led to the Bureau decision and to answer some questions that have been raised by many members of IUPAC bodies.

Bureau discussion. Every Member of the Bureau recognized the importance of this decision for the Union as it positions itself for the next decade—indeed, the next century. The final vote, 20–0, with two abstentions, came only after a careful analysis of the programme and consideration of its long-range impact. During the last few years, there have been extensive discussions of the reasons why the Union must make major changes in its operations to ensure its survival and enhance its role in world-wide chemistry. The proposals made by the *ad hoc* Strategy Development and Implementation Committee after a year's study and debate, provided an integrated programme to effect the necessary changes.

The SDIC recommendations were widely publicized and elicited many comments, both within and outside the Union. In particular, several Division Presidents received extensive input from members of their Divisions who will initially be the most affected by many of the changes. There was widespread support for most or all aspects of the SDIC programme, but also a number of strong criticisms and suggestions for specific alterations in the proposals.

Future role of Commissions. Probably the most contentious issue was the recommendation by the Bureau that in 1999, Council exercise its responsibility under Bylaw 4.302 to decide not to continue any existing Commission beyond the end of 2001. Several very reasonable questions have been widely asked: (i) 'Since the work produced by most Commissions, Subcommittees and Working Parties has generally been highly regarded, why should the 37 Commissions not be continued indefinitely?', (ii) 'Most ideas for new projects have emanated in one way or another from Commissions. If they are not continued, where will new projects originate?', (iii) 'Without continuing Commissions, who will carry out projects (if good ideas can somehow be generated elsewhere)?', (iv) 'If there are few or no Commissions, how will National Representatives be accommodated?', (v) Without a large cadre of Commission members, who will comprise the membership of the Divisions?, (vi) 'How will members of short-term Task Groups develop the kind of knowledge about IUPAC and the loyalty to the Union that characterizes many Commission members?'

These are all very important issues. Let me try to explain the reasoning behind the SDIC recommendations regarding Commissions, which were endorsed by the Executive Committee and now approved by the Bureau. First, the organizational changes recommended by the SDIC are not intended to demean the accomplishments of the members of Commissions or any other IUPAC bodies, nor should the discontinuance of a Commission be interpreted as indicating lack of support for the discipline or special area that it represents. If individuals and/or a group of chemists are carrying out valuable work under the current organizational framework, there is no *a priori* reason why they cannot carry out equally good (perhaps even more effective!) work under a number of other organizational arrangements. There is nothing essential or unique about our current Commission structure, but it does have a long history and some disadvantages, as well as advantages.

According to the *History of IUPAC, 1919–1987*, Commissions originated in 1922, and for over 25 years a relatively small number of Commissions (of the order of 10) were established, discontinued, and re-established in modified form. The names of some of the original Commissions suggest that they were forerunners of some current Commissions [e.g. Chemical Elements (including Atomic Weights), Reform of Nomenclature, Thermochemical Standards, Preservation of Foodstuffs]. After World War II, chemistry expanded rapidly,

and chemists thought of themselves primarily as specializing in one branch of the field. As a result, in about 1950, IUPAC formed Sections on Physical, Inorganic, Organic, Biological, Analytical and Applied Chemistry, with the existing Commissions assigned to Sections, in some instances only one Commission in a Section. However, the Sections were allowed to form additional Commissions and predictably they did, usually by slicing the discipline into subspecialties. By 1955 a total of 33 Commissions were in existence—many of them continuing to the present. Certainly there have been many changes, but the overall structure has been relatively static for 45 years, in spite of continuing pleas from IUPAC Presidents for more flexibility (including Arne Tiselius, already in 1955; Jacques Bénard in 1973; Heini Zollinger in 1981; and Alan Bard in 1993).

Future division programmes. Now, back to the present. Over the last three years a major initiative of the IUPAC Officers, as endorsed by the Bureau, has been to articulate the long-range mission and goals of the Union and, with the help of the SDIC, to develop a Strategic Plan. This gives a sense of direction to the Union as a whole, but it is only a framework and must be 'fleshed out' in practical terms. So far as IUPAC's scientific work is concerned, no single committee—not the Bureau, not the Executive Committee, not the SDIC—can provide expertise over all chemistry. Moreover, no one in IUPAC wants a 'top-down' directed programme; it is not likely to be very good, and it certainly won't work in a volunteer organization. What we need is to have each of the seven Divisions develop its own coherent programme and to have Divisions jointly determine how they can best address many increasingly important interdisciplinary fields. Each Division needs to take a fresh look at its part of chemistry, without the need to accommodate and/or justify a set of pre-existing Commissions. Permanent Commissions, by their existence, tend to emphasize fragmentation and specialization in chemistry, rather than a coherent whole.

During the next two years, it is anticipated that each Division will consider its future directions—and IUPAC's overall future scientific directions—in a thorough and objective manner. Current Commission chairmen can and should play a major role in this process in their capacities as experts in specific aspects of chemistry, not as advocates for maintaining the structure as it currently exists. We also need the participation of leading scientists throughout the world who are not currently directly involved in IUPAC work but who can help the Union decide on future directions. In some instances a Division, or several Divisions acting together, might well set up *ad hoc* planning and strategy groups or even convene a small working conference to elicit broad advice on how IUPAC programmes can best meet the world's scientific needs in particular areas.

In developing their programmes, Division Committees will have a range of available options. They may appoint *ad hoc* advisory, strategy or planning groups as needed. They may appoint Task Groups to carry out individual projects, which can cover a variety of topics. They may propose augmenting the Division Committee if needed, to ensure continuity and oversight in particular programmes. If a Division Committee believes that a particular area requires a longer term Commission (for example, to develop a programme in a new area of chemistry), it may propose the creation of such a Commission, with a well defined mandate and a termination date. Money, rather than the number of Titular Members, will be the principal resource allocated to Divisions and will be used by Division Committees to support their projects, to obtain advice and to manage their programmes. I do not know what the ultimate mix will be, but I hope that each Division will take advantage of the flexibility and opportunities that will be available under the new system.

A project-driven system. What about ideas for projects and people to serve on Task Groups? Over the next three years, I expect that very many projects will be generated in the existing Commissions, but we will also reach out to the entire chemistry community for specific proposals for projects. I believe that some proposals will eventually come from organized groups, such as National Adhering Organizations, national chemical societies and regional federations, and industry groups. However, most will arise, as they do now, from interested groups of scientists, who discover in the course of their work areas to which IUPAC should contribute. We will make positive efforts to solicit ideas at conferences and symposia and from journal editors. By 1 January 1999 we expect to have a mechanism in place to insure that each proposal is subjected to a critical evaluation; if it is approved, the necessary funding can be made available immediately—not at the beginning of the next biennium, as has usually been true in the past. We will provide more details on the evaluation process at a later date, and Divisions will make arrangements to phase in this procedure. Some Divisions will probably find only small changes in the way projects are evaluated, but I firmly believe that this uniform project-driven system will provide very significant advantages in initiating, managing and completing high quality scientific efforts. Meanwhile, of course, existing projects will continue, and many will be completed during the next three years. The Executive Summary of the report by the Committee on Project Evaluation Criteria can found on the next page.

As is true now, the people who work on projects are those who have the necessary expertise and also the interest to take on and pursue the job. Individuals who are currently members of Commissions, Subcommit-

tees and Working Parties meet these criteria, and will undoubtedly be heavily represented on Task Groups, but other scientists who do not necessarily want to make a long-term commitment to IUPAC can and should participate in Task Groups in line with their interests and expertise.

IUPAC's human capital. The membership of Divisions continues in its present form to the end of 2001, and National Representatives will continue on Commissions during this transition period. The Bureau has not yet decided how best to ensure the continuation of viable Division memberships, and precisely what recommendations to make to Council in 2001 for changes in Bylaws, but there are a several options to consider as we gain experience during the next three years. The new structure of Division Committees allows for a limited number of National Representatives, and we will welcome widespread participation on Task Groups from all countries. However, we must consider additional possibilities to ensure a very wide participation from just as many countries as is feasible. I will be in contact with NAOs regarding these issues.

One very important mechanism for maintaining contact with a large group of people who are interested in IUPAC is the Fellows Programme, established by Council in 1997. Everyone who completes service on an IUPAC Commission, Committee, Subcommittee, Working Party or Task Group is eligible for appointment as a Fellow. Of course, not everyone is interested in continuing contact with the Union, but our experience so far in 1998 is that most recently 'retired' IUPAC members welcome the opportunity. With electronic communication methods, it is easy and relatively inexpensive to provide information on IUPAC programmes and to solicit advice and comments from Fellows. After 2001, we should have over 1000 Fellows, and I anticipate that a significant fraction of future Task Group members will continue involvement with IUPAC.

Problems solved and continuing issues. During the two months before the Bureau meeting, I met individually with several Division Presidents and Vice-Presidents and corresponded extensively with others, in an effort to understand the potential problems that each foresaw in implementing the SDIC recommendations and to develop with them specific ways of overcoming the difficulties. Just prior to the Bureau meeting, the Division Presidents held their annual meeting with the Secretary General, devoted almost exclusively to a joint discussion of the SDIC proposals. In particular, we tried to design procedures by which we can guarantee the continuity of IUPAC's important work and ensure the continued recruitment of talented scientists who volunteer to carry out this work. In the end, as the Bureau vote indicates, there was almost unanimous agreement that this programme should be implemented. However, it was also clearly recognized that not all problems are solved and that all of us in the Union must continue to address the issues of implementation during the three-year period before the new system becomes fully effective.

I have had an opportunity to see many of the very thoughtful comments submitted by members of various IUPAC Commissions and Committees, and my own views have been significantly modified as a result. I have tried here to respond to some points and to explain the underlying purpose of what sometimes may initially appear to be arbitrary or unnecessary changes in traditional modes of organization and operation within IUPAC. There are many other aspects of the new system that can be explored further. I invite questions and suggestions, preferably by email, directly <tbecker@nih.gov> or via the Secretariat <secretariat@iupac.org>.

Committee on Project Evaluation Criteria

Executive Summary of the Report of the Committee on Project Evaluation Criteria

Introduction

The key attributes desired of the Project Evaluation Process are that it provides a simple and rapid method for selecting projects to be carried out by IUPAC and its Divisions. It is expected that most of the steps in the process will be carried out by email. Decisions on funding will be made throughout the course of the year as projects are submitted. Most projects will be evaluated and funded by the various Division Committees from their budgets. Interdivisional, Standing Committee and 'large' projects will be evaluated and funded by the Project Committee of the Bureau from a separate fund.

The two general qualities all projects must have to be funded are that they represent good science and that

they are something that IUPAC, as opposed to some other organization, should do.

Process description—Division Committee projects

Any individual or group that wishes to submit a project for funding by IUPAC will be able to download a Project Submission Form and Instructions from the IUPAC Website, or obtain a printed copy from the Secretariat. After completion, the form, and any supporting material, is sent to the Secretariat for distribution to the appropriate Division Committee. If the Division Committee decides to consider the project further, it chooses three reviewers from those named on the submission form or selects reviewers based on its own experience. The Secretariat then distributes the project materials to the reviewers, assembles the reviewers' comments and distributes them both to the Division Committee and the project submitters. After receiving the comments, if any, on the reviews by the project submitters the Division Committee makes a funding decision.

Process description—Project Committee projects

Interdivisional Projects are first evaluated by the relevant Division Committees. The project materials are then forwarded, along with any comments by the Division Committee, to the Project Committee. They evaluate the materials submitted and make their decision on funding. The same process is followed for projects in the area of a Standing Committee, except that the original evaluation is by the Standing Committee. 'Large' projects are those that would require more than 10% of the budget of a Division. These would also be forwarded by the Division Committee to the Project Committee for a funding decision.

Project management

The technical aspects of all projects would be managed by the Division Committee(s) or Standing Committee, including those funded by the Project Committee. For centrally funded Projects, the Project Committee would review project expenditures. Each project group would submit progress reports at agreed-upon intervals.

Retrospective evaluation

Projects will be retrospectively evaluated by the Evaluation Committee of the Bureau two to three years after completion. The criteria used will be those suggested by the project group in its proposal and others chosen by the Committee. The CPEC has recommended that projects completed in the past few years be evaluated in 1999.

A guest essay

What is the role of science in developing countries?

José Goldemberg*

After the Second World War, a small technical elite arose in developing countries such as India, Pakistan, Brazil and Iraq who had been educated as scientists in the industrialized world. They thought that by pushing for 'Manhattan project'-type enterprises in nuclear energy, electronics, pharmaceuticals or space research they could leapfrog the dismally low level of development of their countries. India, for example, started a nuclear energy programme that mobilized thousands of technicians and cost hundreds of millions of dollars but failed to meet power demands.

What my scientist colleagues and national leaders alike failed to understand was that development does not necessarily coincide with the possession of nuclear weapons or the capability to launch satellites. Rather, it requires modern agriculture, industrial systems and education. The technical elite naively believed that spin-offs from their nuclear energy or space programmes would somehow convert their countries to 20th-century industrialized states. Instead, there were heavy economic and political costs. In India, for example, such programmes led to the development of nuclear weapons—which only encouraged Pakistan to do the same—while many basic human needs such as health and education were not given the support they needed.

In my view, this scenario means that we, in developing countries, should not expect to follow the research model that led to the scientific enterprise of the USA and elsewhere. Rather, we need to adapt and develop technologies appropriate to our local circumstances, help strengthen education, and expand our roles as advisers

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in both government and industry. In this way, we can prevent the 'brain drain' that results when scientists are not in touch with the problems of their home countries or when they face indifference—and poor financial support—from their governments.

In Brazil, the use of ethanol as fuel is one example of how this approach can work.[1] By encouraging the wide use of ethanol produced from sugarcane—a traditional crop in the country—as fuel to replace gasoline, the government of Brazil was able replace half of the gasoline used by automobiles in the country (about 200 000 barrels of ethanol per day) with a renewable energy source. In so doing, Brazil became a pioneer in an area that had been neglected by industrialized countries. The entire technology, from the agricultural to the industrial phase, was developed or improved upon by local scientists and technologists. I and other Brazilian scientists first had to convince the government that this approach was technically feasible, even though it had been ignored in industrialized countries. To do this, we had to address questions regarding motor technology, environmental concerns, and the trade-off between raising crops for food vs. fuel.

In general, the misconceptions held by the technical elite are derived from an idea cherished by many in the developing world, that pure research leads to technological development and then to products that open new markets or conquer existing ones (see Fig. 1, model A). This naive 'linear theory' or 'cradle-to-grave' approach to science and development served as a blueprint for the establishment of the National Science Foundation[2] in the USA and was widely copied throughout the world. However, that model fails to stress the interaction that should occur among the phases. As one moves from pure research to technological development and then to production and marketing, unanticipated problems arise that require re-examination and adaptation at the earlier stages.

More realistic are models B and C.[3] Model B corresponds, generally speaking, to present practices in the USA, where some overlap exists between the successive stages. Model C illustrates the Japanese practice of having the three phases completely superimposed. These are the more realistic models that developing countries should follow. In models B and C, practical needs—that is, demand—influence supply, namely, the type of pure research that is done. For example, after the introduction of solid state devices such as transistors made possible the expansion of switchboarding in telephone services, industrial laboratories such as Bell Laboratories lavishly financed solid-state physics.

In developing countries, government goals and the 'demand side' pull are often lacking. As a result, universities and research centres have become isolated from the rest of the country in an 'ivory tower', more connected to research centres in Europe or the USA than to the obvious needs of industry, agriculture and education in their own countries. Science and technology budgets receive little support from the private sector and instead depend on the national treasury.[4] Heavy government bureaucracies wind up cultivating whatever science and technology is fashionable in the developed countries, waiting indefinitely for the time when such competence would trigger development.

What, then, is a realistic view of the role of basic science in developing countries? After all, many outstanding scientists born and educated in developing countries have contributed significantly to the advancement of science. Talent exists everywhere. What can they do to help their countrymen in solving the problems of development? The answers, in my view, are the following:

1 Help adapt technology to local circumstances. Even when technologies are imported from abroad, research is necessary to make them work. Rather than insisting on developing indigenous technologies, when abundant and well-proven technologies exist, scientists can help choose the right ones, given the local environment and available raw materials, and learn how to use them. An example is given by the 'green revolution.' Despite its shortcomings, this

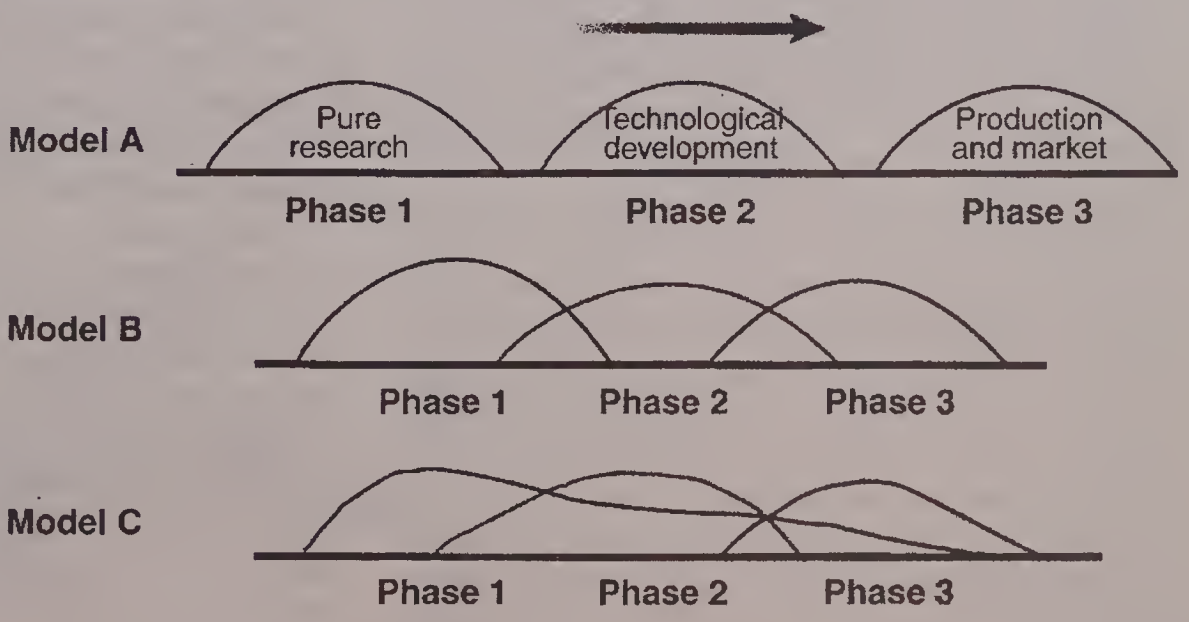


Fig. 1

'imported' technology, when applied properly in the developing world, helped eradicate hunger. Problems with the use of pesticides and fertilizers arose because of abuses by commercial interests and because, owing to a lack of knowledge, users and local scientists failed to provide the expertise or make the adaptations necessary to make the best use of the imported technology.

2 Incorporate new science into education. Development requires a well-trained work force; therefore, high-quality education must be put in place early in development. The teaching of modem science in engineering or medical schools cannot be restricted to the same old classical textbooks but has to be done by active scientists who read the current literature and are capable of conveying the latest advances to their students. This approach worked well in the 19th century during the Meiji restoration, which brought Japan into the modem world.

3 Be involved in government. Science and scientists are an important element in choices and decisions made by governments and can make a difference. For example, at one time the Brazilian government had to set the reservation boundaries for the Yanomamis, a primitive group of some 10 000 indigenous people living in the mineral-rich Amazon basin. The issue was whether to set up one large, or several small, reservations. The military and the mining groups favoured small reservations, as Indian reservations are 'out of bounds' for them according to Brazilian law and could restrict their movements in that region. But anthropologists advised that this solution would destroy the Yanomami civilization, because these Indians were accustomed to long-distance migrations. As the federal Secretary for Science and Technology, I argued for one large reservation, a solution that was adopted.

I also helped to mediate a conflict in Brazil between multinational enterprises that had computer technology and wanted free access to local markets, and local entrepreneurs who wished to preserve the markets for themselves. In the 1980s, the local entrepreneurs convinced the government to establish high import barriers, virtually isolating the region and condemning it to use obsolete technology. I helped resolve this issue by convincing foreign companies and local enterprises to set up joint ventures in which the technology came from abroad but the manufacturing was local.

Scientific research is motivated not only by curiosity or love for science, but also by fashions and the perception that some areas of research are more rewarding than others. The current emphasis given to costly therapeutics for the treatment of AIDS is counterproductive in developing countries, where a vaccine against the disease is the only real hope. It is important that developing countries avoid the allure of costly but ineffective programmes and establish a system that rewards solving practical problems. Although that emphasis may seem to stray from the tradition of academic research, the truth is that many seemingly mundane problems require very sophisticated tools and technologies. Science can also accelerate progress. This has occurred in agricultural research, which is highly advanced in developing countries such as Mexico (corn), Brazil (soybeans and sugarcane), and the Philippines (rice).

In conclusion, my experience has shown that the transition of a country from developing to developed is a complex process that requires facing up to the established interests in society. The impetus for this has to come not only from scientists, but from other sectors of society as well. In a world where globalization and competitiveness are the rule, progress requires that developing countries find areas in which they are significantly better than their competitors because of a better trained work force, favourable natural resources, or scientific and technological capabilities. Science and scientists can play an important role in determining those choices and implementing development strategies.

Acknowledgement

I thank G. Moscati for useful discussions.

References

1 J. Goldemberg, L.C. Monaco, I.C. Macedo. In: *Renewable Energy Sources for Fuels and Electricity*, T.B. Johansson, H. Kelly, A.K.N. Reddy, R.H. William, Eds. Washington, DC: Island, 1993: 841–863.

2 V. Bush. *Science, the Endless Frontier*. Washington, DC: US Government Printing Office, 1945.

3 H. Brooks, *What we know and do not know about technology transfer. Linking knowledge to action in marshalling technology for development*. From a symposium held in Irvine, California, 28–30 November 1994. Washington, DC: National Academy Press, 1995: 83–96.

4 J.-J. Salomon. In: *Strategies for the national support of basic research: an international comparison*. Proceedings of a conference sponsored by the Israel Academy of Sciences and Humanities, Jerusalem, 23–26 October 1994. Jerusalem, Israel: Israel Academy of Sciences and Humanities, 1995: 23–41.

Reports from IUPAC sponsored symposia

Fifteenth international conference on chemical education: chemistry and global environmental change. Cairo, Egypt, 9–14 August 1998

Symposium: tertiary vocational training in chemistry related to health care

The International Conferences on Chemical Education, are held biennially under the auspices of UNESCO and the International Union of Pure and Applied Chemistry (IUPAC). The 15th Conference was held in Cairo from 9–14 August 1998, organized by the Chemistry Department in the Faculty of Science at Ain Shams University, Cairo, Egypt. The theme for this conference was '*Chemistry and Global Environmental Change*'. The pivotal role of IUPAC in the development, and education in, chemistry means that IUPAC has an inevitable and essential role in these conferences. It follows that its Committee on the Teaching of Chemistry (CTC) is the essential interface between IUPAC and the organizers of the International Conferences on Chemical Education.

In 1995, as part of a reorganization within IUPAC, the Clinical Chemistry Division and the Medicinal Chemistry Section were amalgamated into a new Division of Chemistry and Human Health. Up to this point both the Medicinal Chemistry Section and the Clinical Chemistry Division were represented at CTC by Prof. C.R. Ganellin and Dr H.G.J. Worth, respectively. When the theme for the 15th Conference was announced, it was agreed that it would be appropriate for the new Division (which was in a gestational stage at this point), to make a contribution. Professor Ganellin and Dr Worth agreed to organize a joint symposium on behalf of the new Division. Their programme, which was endorsed by both the CTC and the Chemistry and Human Health Division, is shown in the Appendix. The symposium was presented on the morning of Wednesday 12 August 1998.

Both Clinical Chemistry and Medicinal Chemistry are important areas of science, where chemistry graduates can (and do) make major contributions in the application and development of the science. They are areas that are not always well understood by teachers of chemistry, and consequently students are not always encouraged to embark upon careers in these challenging areas. This was the general theme of the symposium with specific areas highlighted in each of the individual presentations. Dr Worth defined the role of the clinical chemistry department within the hospital laboratory service, and indicated the interrelation between chemists and other professional groups, particularly medical graduates, and the role of the chemist within this. Dr Khatami's presentation indicated the difficulties of the development of clinical chemistry within developing countries. These problems are often similar to those in so-called developed countries, but perhaps more intense. Finally, Dr Duffus considered toxicology as a speciality within clinical chemistry, and indicated the particular problems that there are in training in toxicology for chemists. With the increasing awareness of the relationship between chemicals and the environment, it is the chemist whose advice is frequently sought, but who is often poorly educated in this respect, as toxicology does not feature in the curriculum of many chemistry graduates.

In the section on Medicinal Chemistry, Professor Ganellin indicated the essential role that is played by chemists in the development of drugs within the pharmaceutical industry. It is well recognized that pharmaceutical companies prefer to recruit competent organic chemists with good potential and train them in medicinal chemistry. This emphasizes the importance in training good synthetic organic chemists and to include some insight into the requirements of medicinal chemistry in order to encourage the good chemists to look for careers within the pharmaceutical industry. Dr Kobayashi gave a comprehensive overview of the pharmaceutical industry world-wide, and indicated the role of Asia within that context. This includes conventional medicinal chemistry as practised by the pharmaceutical industry, but also Chinese and herbal medicines based upon traditional Asian practices. Medicinal chemistry has an important role in combining these approaches, particularly in identifying active components in herb medicine. In Latin America there is perhaps less output for medicinal chemists within the pharmaceutical industry, as it tends to concentrate its research and development in other geographical areas. However, there is an important role in the teaching of medicinal chemistry within university faculties and these are concentrated primarily in chemistry departments and schools of pharmacy. Professor Gupta described a major programme throughout Latin America where data on curricula for the teaching of medicinal chemistry is being correlated across about 30 institutions.

Unfortunately, Dr Khatami was unable to attend the conference and could therefore not make her presenta-

tion. This was read on her behalf by Dr Worth.

The overall attendance of the symposium was about 30–40 participants, which the speakers felt was disappointing, but in fact was typical of most of the symposia. However, some useful discussion was generated which may well lead to further discussion and developments outside the conference.

On of us (H.G.J.W.) would like to acknowledge the support of the British Council.

H.G.J. Worth

Appendix

Clinical chemistry—Chairman Prof. C. R. Ganellin

Postgraduate Curriculum for Training in Clinical Chemistry
Dr H.G.J. Worth, Department of Clinical Chemistry, The King's Mill Centre for Health Care Services, Sutton in Ashfield, Nottinghamshire, NG17 4JL, UK.

Clinical Chemistry Training in Developing Countries
Dr Z. Khatami, Officer in Charge of QC and Biochemistry Department, WHO Collaborating Centre, National Reference Laboratories of Iran.

Toxicology for Clinical Chemists
Dr J.H. Duffus, The Edinburgh Centre for Toxicology, 43 Mansionhouse Road, Edinburgh, EH9 2JD, Scotland, UK.

Medicinal chemistry—Chairman Dr H.G.J. Worth

Training Medicinal Chemists for Research in Industry
Prof. C.R. Ganellin, Department of Chemistry, University College of London, 20 Gordon Street, London EC1H 0AJ, UK.

The Situation for Educating Medicinal Chemists in Asia
Dr T. Kobayashi, Lilly Research Laboratories, Eli Lilly, Kobe, Japan

Teaching of Medicinal Chemistry in Latin America
Prof. M.P. Gupta, College of Pharmacy, Pharmacognosy Research Center, Estafeta Universitaria, University of Panama, Panama, Republic of Panama

7th International chemistry conference in Africa and 34th convention of the South African Chemical Institute. University of Natal, Durban, 6–10 July 1998

The 7th International Chemistry Conference in Africa (7ICCA) combined with the 34th South African Chemical Institute (SACI) Convention was held at Natal University, Durban (Shepstone Building) from 6 to 10 July 1998. It was the first time that an ICCA meeting had been held in South Africa.

It was the largest chemistry conference ever held in Africa, and attracted over 600 delegates. The Plenary lecturers included Nobel Laureate, Prof. Jean-Marie Lehn of France, Prof. Peter Day, FRS, Director of the Royal Institution of Great Britain, Prof. Peter Atkins, the well known Physical Chemist and Philosopher from Lincoln College, Oxford, and Prof. Krishna V. Sane of the Jawaharlal Nehru Centre for Advanced Scientific Research in Bangalore, India. His work on cost effective education in science in the 21st century is relevant to Africa today. The keynote speakers included Prof. David King, FRS, Head of Chemistry at the University of Cambridge, UK.

The conference was sponsored by the International Union of Pure and Applied Chemistry (IUPAC) and was

Delegates at the opening ceremony, 7ICCA. From left to right: Prof. Ernst Breedt, President of the South African Chemical Institute, Prof. Paul Walter, President of the American Chemical Society, Dr. L.P.H.M. Mtshali, Minister of Arts, Science, Culture and Technology, Republic of South Africa, Prof. Trevor Letcher, Chairman of the Organizing Committee and Prof. Joshua Jortner, President of IUPAC.

attended by the President of IUPAC, the eminent chemist, Prof. Joshua Jortner of Israel and the Secretary General, Dr Ted Becker.

Financial support for the conference came from many sources including the American Chemical Society, whose President, Prof. Paul Walter, and Director of the Office of International Activities, Dr J. Malin, attended the conference.

The 12 plenary and two keynote lectures were the highlights of the conference. One hundred and thirty-five oral presentations in the form of parallel sessions were also given and two hundred and fifty posters were presented in two sessions.

Opening ceremony of the 8th International Symposium on Solubility Phenomena. From left to right: Prof. Hideo Akaiwa, Chairman of the Symposium; Prof. John Lorimer, Representative of IUPAC; Prof. Koske Izutsu, President of the Japan Society for Analytical Chemistry; Prof. David Shaw, Chairman of the Commission on Solubility Data, IUPAC; Prof. Masaaki Arakawa, President of Niigata University.

The conference was organized by a team of chemists from the University of Natal, Durban (UND) and local Universities and Technikons and was chaired by Prof. Trevor Letcher and Dr Bice Martincigh of UND. The theme of the conference was 'Chemistry for the Development of Africa in the 21st Century'. An exhibition of books, chemicals and equipment was presented and was well patronized by the delegates. The conference was honoured in having Beilstein, the well known German chemical information service company, display their products.

The conference was also host to a number of other meetings, including a special meeting of the International Organization for Chemical Sciences in Development (IOCD), an historic meeting of IUPAC and the African Association of Pure and Applied Chemistry (AAPAC), a session given by the Chemical and Allied Industries Association on Responsible Care: Managing Health, Safety and Environmental Performance in the Chemical Industry, and a special meeting on low cost chemical education for local educators.

T. M. Letcher

8th International Symposium on Solubility Phenomena 5–8 August 1998, Niigata, Japan

The city of Niigata, due north of Tokyo on the Sea of Japan, was the site of the *8th International Symposium on Solubility Phenomena*. The Symposium was chaired by Hideo Akaiwa, President of Gunma University, with Hiroshi Miyamoto of Niigata University as Vice-Chairman and Kyoshi Sawada of Niigata University as General Secretary. Joint organizers were IUPAC Commission V.8 (Solubility Data), The Japan Society for Analytical Chemistry and Niigata University. The Symposium also welcomed the sponsorship of IUPAC, The Science Council of Japan, The Chemical Society of Japan, The Japan Association of Solution Chemistry and the Japan Society of Coordination Chemistry. Financial support from The Ministry of Education, Science, Sports and Culture, Japan, four other foundations and two industries is acknowledged.

One hundred and fifty-four participants from 22 countries (Australia, Austria, Bulgaria, Canada, China, Czech Republic, Egypt, Finland, France, Germany, Hungary, Israel, Japan, Poland, Portugal, Russia, Sweden, Switzerland, Tunisia, Turkey, UK and USA) took part. Of the scientific participants, 102 were from Japan and 40 from elsewhere. There were also 12 accompanying persons. The Symposium was reported in the local Niigata newspaper, with a photograph and mention of IUPAC.

Two days before the Symposium, Niigata was hit by a record 25 cm of rain in a few hours, flooding the storm sewer system and making many streets impassable, including that in front of the Bandai Civic Hall, the venue of the Symposium. Fortunately, everything but the elevator had dried out in time, and the main disruptions were to the annual meeting of Commission V.8 preceding the Symposium and the opening mixer.

Those taking part in the opening ceremonies were Hideo Akaiwa, President, Gunma University and Symposium chair; Masaaki Arakawa, President, Niigata University; Kosuke Isutsu, President, The Japan Society for Analytical Chemistry; David Shaw, Chair of IUPAC Commission V.8; and Jack Lorimer, IUPAC representative.

Plenary lectures were given by George H. Nancollas (USA), 'The dissolution and growth of sparingly soluble inorganic salts: a kinetics and surface energy approach', and Kosuke Isutsu (Japan), 'Studies on the electrochemical approach to ion solvation'. Eight invited lectures were given by Mihaly Beck (Hungary), Hotoshi Watarai (Japan), Boris Spivakov (Russia), Pirketta Scharlin (Finland), Mark Salomon (USA), Heinz Gamsjäger (Austria), Jean-Claude Bollinger (France) and Masaaki Tabata (Japan). In addition, there were 37 contributed papers and 68 posters. H.L. Clever (USA) presented a special poster on the history of the Solubility Data Project. The invited lectures, contributed papers and posters covered the general areas of: chemistry of crystallization and dissolution; analytical chemistry related to phase transfer; thermodynamics and kinetics in solution; biomineralization; and compilation and evaluation of solubility data. Lectures and contributed papers were given in six sessions, and there was a very lively half-day poster session. It is planned to publish the plenary and invited lectures in *Pure and Applied Chemistry* under the editorship of Peter Fogg (UK).

Opening Ceremony of the 14th IUPAC Conference on Physical Organic Chemistry. From left to right: interpreter; Sergio Gargoni, Director Superintendent of the Institute Euvaldo Lodi; Francisco E. Viera, General Director of the Foundation of Science and Technology of the State of Santa Catarina; Prof. Rodolfo Pinto da Luz, Rector of the Federal University of Santa Catarina; Prof. Eduardo Humeres, UFSC, Organizer of the Conference; Prof. Thomas T. Tidwell, representative of IUPAC; and Prof. Carlos Alberto Kuhnen, Director of the Center of Physical and Mathematical Sciences, UFSC.

Participants enjoyed an evening reception and the Symposium banquet, as well as a rainy and foggy half-day excursion to Yahiko Shrine and Mountain followed by a seaside barbecue. Accompanying persons were well looked after, with tours to a wealthy farmer's house and of Niigata City, as well as taking part in the traditional Japanese arts of flower arranging and the tea ceremony.

The organizers are to be congratulated on providing an excellently organized meeting that provided valuable new information on many aspects of solubility phenomena. The informal, friendly atmosphere during both the scientific meetings and social events left the participants with a deep appreciation of Japanese hospitality.

J. Lorimer

The 14th IUPAC International Conference on Physical Organic Chemistry

The 14th IUPAC International Conference on Physical Organic Chemistry (ICPOC-14) was held from the 16th to the 21st August 1998, in Florianopolis, Santa Catarina, Brazil, with an attendance of 260 people from 43 countries. With 14 meetings since 1972, ICPOC is one of the longest-running conferences sponsored by IUPAC, and has now met in Asia, New Zealand, the Middle East, North and South America, and Europe, and fulfills the IUPAC mandates of globalization and diversification.

The plenary lectures at the Florianopolis Conference illustrated the breadth of this field. By way of example, the keynote lecture by Professor Ronald Breslow (USA) 'The Hydrophobic Effect as a Mechanistic Tool' and others lectures by Professors Norma Nudelman (Argentina) 'The Role of Complexing Effects in Defining the Mechanisms of Some Organometallic Reactions', and Jose Riveros (Brazil) 'Recent Advances in the Energetics and Mechanisms of Gas Phase Ionic Reactions'. Other plenary lectures by K. Houk (USA), H. Iwamura (Japan), U. Tonellato (Italy), L. Radom (Australia), and D. Reinhoudt (the Netherlands), dealt with theoretical studies of molecules and reactions, reactions in aggregates, magnetic properties of radicals, and supramolecular chemistry.

The broad scope of the field has been presented in the Symposium-in-Print 'Physical Organic Chemistry for the 21st Century' (*Pure Appl. Chem.* 1997, 69, 211–292), and copies of this report were distributed at this meeting, as has been done already at Conferences in Italy, Japan, Belgium and the USA, in addition to Internet posting <http://www.iupac.org>.

The Florianopolis Conference had 216 scientific contributions which were submitted from 43 countries. The Chair of the National Committee was Professor Eduardo Humeres of the Universidade Federal de Santa Catarina, the host institution of the meeting. There were also Pre-conference and Post-conference Symposia in Mexico City and Puerto Iguazu (Argentina), respectively.

Together, these meetings showed not only the worldwide dynamism of Physical Organic Chemistry, but also the strength and maturity of the chemical sciences in Latin America.

Prof. Thomas Tidwell

Reports from Commissions

Nomenclature Committee of IUBMB (NC-IUBMB) and IUPAC-IUBMB Joint Commission on Biochemical Nomenclature (JCBN)

Report of current activities, May 1998

As stated in the committees' web page <http://www.chem.qmw.ac.uk/iubmb/nomenclature/>, 'the purpose of the committees is to coordinate recommendations to aid communication of biochemical information by encouraging scientists to use generally understood terminology'.

At our meeting in Prague on 16–18 May 1998, two large projects occupied most of our time, bioinformatics, and listing enzymes, the first two of the following topics.

1. Bioinformatics

On bioinformatics, we are already participating in the scheme that Berendson has put to ICSU. But we are more excited by the ideas Cantor had produced on forming an International Network of Protein Databases. He pointed out the need to collect experimental work on proteins over the last 50–100 years, and put it into computer-readable form, so that the knowledge could readily be accessed. This is precisely within the function of the Unions to spread scientific knowledge. He outlined how this could be approached.

The aim would be a database for each protein or type of protein. To be widely useful, standards would need to be similar for each. Laying these down would be the first phase. Berman has done some pilot work with students. This phase would need to be tried with several different proteins so as to develop a robust procedure. This would be followed by an educational phase, finding local editors for each database, and teaching them, e.g. by running workshops. Much of this could be in relatively undeveloped countries, and many of the databases could be located there. Quality control procedures would need to be set up.

Members raised many difficulties, but agreed that these could probably be overcome, and that the whole project was worthwhile. It would involve inter-Union collaboration, and would commission much work in less developed countries, where it would give opportunities to those interested in bioinformatics who have no lab.

A working party was set up, headed by Cantor, with Apweiler, Bairoch, Berman, Cammack, Cornish-Bowden, and Tipton. They could call on others; all members of the committees were willing to help. They would:

(i) lay out a preliminary set of guidelines for (a) standards for the databases, and (b) standards for the types of data to be included;
(ii) run a pilot study on a few proteins; and
(iii) try to obtain sponsorship.

Cantor would seek IUPAB participation, so that it would be inter-Union from the start.

2. Enzymes

The listing of enzymes remains a large part of the committees' work, since the accurate and unambiguous description is used in many fields and is needed in databases. Most of the points had been raised by correspondence before the meeting, and this made it possible to go through a large supplement to the list.

2.1. We approved complete descriptions for listing 151 new enzymes. Two clarifications are awaited before these can form a supplement for submission to *Eur. J. Biochem.* and publication on WWW pages. We were interested in how often authors made errors in submitting enzymes for listing, one even giving a chiral descriptor to an achiral substrate.

2.2. We modified the descriptions of 38 previously listed enzyme in major ways. These will be added to the new entries in the supplement.

2.3. A very large number of existing entries received minor modifications, and these will appear in the next general update of the list.

2.4. In addition to enzymes generally, peptidases required special treatment. The entries for about 250 enzymes were modified by adding further information about the classes they belonged to.

2.5. We agreed to that the whole list now needs revision, and that we would examine it, one subclass at a time, using a closed website for circulation within the committees.

2.6. We identified specific groups of enzymes in urgent need of updating, including GTPases, initiation and elongation factors, transporting ATPases and protein kinases. Advice is being obtained from groups of experts in each case.

2.7. Linkage is proceeding of Enzyme Nomenclature to other databases, including those for thermodynamics (GOLDBERG), enzyme properties (BRENDA), metabolic properties (KLOTHO, DRAGON, etc.), clinical chemistry (CPNU) and structural features (SWISSPROT, TREMBL, etc.).

2.8. We agreed to seek advice on formulating procedures for dealing with multifunctional enzymes.

2.9. We are working on the classification of catalytic antibodies, ribozymes, mutated and synthetic enzymes, protein kinases.

3. Metabolic pathways

Don Nicholson has generously transferred the copyrights on his metabolic charts and Inborn Errors of Metabolism to IUBMB. The nomenclature committees give high priority to presenting the charts in computer-readable form on the web, and are keen to contribute to this by working with him. They will therefore be delighted to learn that negotiations with Sigma are proceeding, and that there is the prospect that Sigma will support the web version.

4. Transport proteins

Kotyk pointed out that the coverage of transport proteins in *Enzyme Nomenclature* was poor. He was appointed to form a panel to advise on these and Apweiler, Cantor and Dixon were willing to serve on it, and M. Ashburner and Apweiler would try to raise financial support for the work.

5. Biotechnology

Schmid told the committees of the work of the IUPAC Commission on Biotechnology (COB), which is presented on <http://www.itb.uni-stuttgart.de:8080/IUPAC/homepage/iupac.html>. Several items of common interest emerged, and the committees will work with COB on them.

6 Published recommendations and web access

Nomenclature-of-Carbohydrates, published in *Pure Appl. Chem.* 1996, **68**, 1919–2008; *Adv. Carbohydr. Chem. Biochem.* 1997, **52**, 43–177; *Carbohydr. Res.* 1997, **297**, 1–90; *J. Carbohydr. Chem.* 1997, **16**, 1191–1280, is now available on the web <http://www.chem.qmw.ac.uk/iupac/2carb/>. It is being consulted about 140 times per week. Apart from organic class names <http://www.chem.qmw.ac.uk/iupac/class>, at 450 per week, it is more consulted than any other IUPAC document, though closely followed, at 130 per week, by our recommendations on Nomenclature-and-Symbolism-for-Amino-Acids-and-Peptides <http://www.chem.qmw.ac.uk/iupac/AminoAcid/> and (100 per week) the section of Enzyme-Nomenclature on peptidases <http://www.chem.qmw.ac.uk/iubmb/enzyme/>, which is about to be updated (see 2.4 above). (These figures exclude local access to the sites.) Our steroid recommendations <http://www.chem.qmw.ac.uk/iupac/steroid>, added in 1996, receives 80 visits per week.

Nomenclature-of-Glycolipids was published (*Pure Appl. Chem.* 1997, **69**, 2475–2487) and will appear in *Eur. J. Biochem.* 1998; it is now also on the web at <http://www.chem.qmw.ac.uk/iupac/misc/glylp.html>

The following recommendations of ours have been added to the website since 1 May 1997. The URL is always <http://www.chem.qmw.ac.uk/>, followed by that given below. The final column gives the approximate weekly visiting over the last few weeks:

Nucleic acid sequences	iubmb/misc/naseq.html	20
Branched nucleic acids	iubmb/misc/bran.html	5
Multienzymes	iubmb/misc/menz.html	5
Newsletter	iubmb/newsletter	30
Polypeptide conformation	iupac/misc/ppep1.html	20
Polynucleotide conformation	iupac/misc/pnuc1.html	10
Glycoproteins	iupac/misc/glycp.html	15

Total usage of IUPAC's and our recommendations on the web is 1300 per week and comes from 95 countries.

7. Other needs

We are contacting previously appointed working parties, setting up new working parties, and seeking advice from individuals, in order to assess needs and the progress being made to meet such needs.

H.B.F. Dixon
Chairman of JCBN
28 May 1998

Commission on Toxicology—VII.C.2

Minutes of Commission Meeting in Edinburgh. University of Edinburgh, 10–13 September 1998

Reports from sponsored scientific meetings and proceedings

Assessment of Carcinogenic Risk of Inorganic Substances, Luxembourg. The proceedings were published in 1997 by the Royal Society of Chemistry, Cambridge: J.H. Duffus (ed.) *Carcinogenicity of Inorganic Substances*.

1st International Conference on Trace Element Speciation, Munich. This conference was attended by Drs Duffus, Templeton and Cornelis, who was a member of the scientific committee. The excellent 3-day conference was attended by 120 participants. The proceedings will be published in the *Fresenius Journal on Analytical Chemistry*.

5th International Symposium on Metal Ions, Munich. The conference was attended by Drs Duffus, Cornelis, Heinrich-Ramm and Templeton, who was on the scientific advisory board. A book of abstracts has been published.

Conference on Chemical Education in Cairo, August 1998. Dr Duffus attended the well organized conference and gave a presentation on the Curriculum on Toxicology as part of the Clinical Chemistry Symposium. At a meeting with CTC during the conference Dr Duffus presented the status of ongoing joint activities. A short report on the conference symposium: 'Tertiary vocational training in chemistry related to health care' was prepared by Dr Howard Worth and can be obtained from the ComTox secretary (Dr Birger Heinzow, e-mail <bheinzow@lanu.landsh.de>) upon request (see page 171).

Status report on publications of the Commission and Co-operation with other Committees

As a joint project agreed upon with CTC at the General Assembly in Geneva, Dr Duffus has prepared a draft 'Toxicology: an Introduction'. The manuscript was favourably accepted by the CTC and is under circulation. ComTox members should send their comments to Dr Duffus within 3 months. The final version should be ready for publication by CTC at the next General Assembly in Berlin. This educational material should be made available as a download from the Internet and the *PowerPoint* graphics can easily be adapted to other languages. The material aims at courses of an introductory level, e.g. teaching in high schools, and might be especially useful for developing countries. Sponsorship will be sought.

The co-operation with the IPCS will continue as outlined at the meeting in Geneva with Dr Mercier, An advanced toxicology textbook for schools is in the process of publication by IPCS following a review stage involving Dr Duffus. Further co-operation with ComTox is appreciated by IPCS.

Dr Duffus will represent IUPAC (observer status) at the forthcoming IPCS Programme Advisory Meeting, Berlin, 5–8 October 1998.

The manuscript on *Sample Collection Guidelines for Trace Elements* by Dr Cornelis, published in *Pure and Applied Chemistry* has been reprinted in *Clin. Chem Acta* and *Eur. J. Clin. Chem. Clin. Biochem.*

Status report on forthcoming IUPAC ComTox sponsored or supported meetings

6th ComTox Symposium 2001, Uppsala. Dr Sunderman Jr will be contacted to obtain the latest status of the organization of the planned conference. The Commission welcomes and encourages the conference, Dr Sunderman is asked to contact Drs Hans Tjälve and Monica Nordberg to clarify the process at his earliest convenience.

3rd Congress of the Cuban Chemical Society, 1–4 December 1999, Havana. Dr Heinzow was approached by the organising committee from Cuba seeking support for the conference. It was suggested that they organize, as a course, a symposium on risk assessment and environmental chemistry , and make inquiries concerning external funding. The organising committee welcomed the proposal, and will discuss it at its next meeting in October 1998. When it is accepted, Dr Heinzow and Dr Duffus will finalize the programme for the course; several experts from Europe have expressed their support and interest in participation.

Status report of ComTox Working Parties and Projects

Biomonitoring of VOCs: Dr Heinrich-Ramm presented the final draft, which has been circulated before to the ComTox members. The paper was thoroughly revised during the Copenhagen meeting and was accepted by the Commission. After a clarification of copyright issues for the graphs, the paper will be handed on to the IUPAC review process.

Exposure assessment and decision rules in compliance testing for implementation of exposure limits. Dr Christensen explained the title change to *Rules for stating when a limiting value is exceeded*, and planned a

revision related to the experience of the ISO-guide working party referring to the draft ISO 10576-1 and a statistical paper by E. Holst. The statistician Peter Wilrich from Berlin has joined the working party. Suggestions by the ComTox members were made, outlining the scope and practical aspects in more detail in the introduction and adding a glossary and a list of symbols and abbreviations as an appendix. The manuscript will be re-circulated by the end of November and finished by the next General Assembly.

Combined effect. Dr Heinzow reported that a first draft has been prepared and that a meeting will be held at forthcoming ICCEF in September in Baden/Vienna and the status will be given thereafter by Drs Poech and Herzig.

Dr Herzig reported in the meanwhile that his proposals were positively accepted and that a nucleus working party will prepare a completely revised draft by the end of 1998. A meeting of 10 experts is planned, Dr Herzig will try to get the necessary funding; otherwise the next group meeting will not be possible before the next ICCEF conference in Finland (in 2000)

Exposure assessment using the Logbook Method. The status of the project was presented by Erik Olsen. A preliminary draft version was circulated that had been prepared by Erik Olsen, Erik Holst, Robert Herrik and Patricia Stewart. The document outlines the logbook method from a practical viewpoint and will be valuable for a realistic estimate of exposure on an individual basis.

Risk assessment, educational material. A document 'Risk assessment for occupational exposure to inorganic compounds' was prepared by Rob Herber and John Duffus; the group will convene in October in Amsterdam. Comments and additional information should be forwarded to John Duffus. It was suggested that there be an expansion on of the section on general aspects of risk assessment and that it should not focus merely on inorganic matter.

Modelling outdoor exposure. The project will be delayed by several months for unforeseen personal reasons.

Risk assessment of particulate matter. The project was delayed; the group will meet in New York in December. The issue is at present under active discussion. The document should include the more recent knowledge on cofactors of particulate toxicity such as iron content and redox cycling.

Status report on manuscripts and reports

The document: 'Toxicology: an Introduction' prepared by John Duffus, with input by Howard Worth, was circulated. Comments are invited and should be forwarded to John within the next 2 months. Regine Heinrich-Ramm will provide educational material from the German Chemical Society (GDCh).

The joint IUPAC–IFCC Technical report on *Properties and Units in the Clinical Laboratory Sciences* has been re-published: IX. Properties and Units in Trace Elements, prepared by R. Cornelis, X. Fuentes-Arderiu, I. Bruunshuus and D. Templeton. *Clin. Chim. Acta* 1997, **268,** S75–S89, and *Eur. J. Clin. Biochem.* 1997, **35**(10), 833–843.

A draft (6th edition) of *IUPAC Guidelines for Terms Related to Chemical Speciation and Fractionation of Trace Elements: Definitions, Structural Aspects and Methodological Approaches*, by D. Templeton, F. Ariese, R. Cornelis, L-G. Danielson, H. Muntau and H.P. van Leeuwen has been completed. The definitions were discussed and minor modifications suggested including a cross-check with the 'Gold Book'. The project is close to completion; comments should reach Rita Cornelis by 10 October.

New Commission members

On behalf of the Irish National Committee for Chemistry, Dr Iona Pratt was nominated as National Representative, replacing Dr William King who has served for 12 years.

Dr Pratt will be contacted by the secretary and informed about the ongoing activities and invited to join existing projects.

IUPAC reorganization

Dr Cornelis and Dr Duffus informed the Commission about the planned reorganization of IUPAC; details were also given in the last issues of *Chemistry International* (*Chem. Intl.*, 1988, **20**, no. 2, 21–24 and no. 3, 55–76). Briefly the new approach will reduce or abolish Commissions and favour limited time-funded working parties, and will introduce external evaluators. Although the ComTox members have some doubt as to whether the new process will prove to be more productive than the existing system, they look forward to the restructuring and will provide their continuing support to IUPAC as required. The issue of risk assessment and decision rules, including statistical aspects, will remain the main focus for the forthcoming activities of ComTox until restructuring occurs, and it is believed that this will also continue to be important to IUPAC after this time. ComTox is convinced that there will be a need for a con-

tinuing IUPAC concern for toxicology and Dr Duffus undertook to prepare a case for this.

Preparation for the next General Assembly in 1999

The next General Assembly will be held in Berlin. Dr Heinzow will supply Commission members with information on hotels/guest houses in Berlin for accommodation and travel, as well as public transport in Berlin.

Miscellaneous/Website activities

Dr Duffus introduced the proposal of a ComTox website, providing information about ongoing projects and existing educational material on the Internet. The site could be operated free of charge for ComTox within the Edinburgh University website on Health, Environment and Work, with a link to the IUPAC website.

A photograph of the commission members at the University of Edinburgh can be found under <http://www.med.ac.uk/hew/tox/>. In addition, a self study course entitled 'Introduction to Applied Toxicology' prepared by Dr Duffus is available from <http://www.med.ac.uk/hew/tox/>.

B. Heinzow
Secretary of Commission VII.C.2
and
J. Duffus
President of Commission VII.C.2
September 1998

Commission on Separation Methods in Analytical Chemistry—V.3

Report of the Meeting in El Escorial, Madrid, 5-6 September 1998

Future of IUPAC—Discussion of SDIC report

Implications for projects and Commission
The Secretary reported on the meeting in Idstein and on some of the implications for the Commission in the SDIC report. The clearest description was given in a recent *Chemistry International* (May 1998).

The principal effect was that the Commission would be dissolved in 2001 but as yet, the structure(s) which would replace it were not yet clear. The comments followed those concerns expressed in Idstein that continuity would be lost and that the Analytical Division Committee, even if it were greatly expanded, would have limited ability to generate projects and less capacity to execute them. The Analytical Division operated over a wider range of activities than many other Divisions. A version of advisory panels linked to Commission members was one possible alternative.

The view was expressed that it was important that the details of how continuity would be achieved were available before the Berlin General Assembly so that they could be discussed. Unless it was clear where we were going, little new activity could be initiated in Berlin and the programme of activities would rapidly start to die out. The 2001 meeting should not be the final one, but a transitional meeting to a new format.

No strong views were expressed on the project-driven formula, except that the generation of projects in a top-down sequence would be unlikely to be successful. What is needed was the interest from the members carrying out the projects. The concept of NAO organizations generating projects was also thought to be unlikely to succeed unless the project was also felt to be of importance by the Division members

A concern was expressed that by the time project proposals had passed through the acceptance procedure, the original proposers would have lost interest. Rather like many other aspects of IUPAC, the time scales are too long.

To some extent, the proposals are still at a very nebulous stage and what was needed was much more detail of how they would affect the work that is currently carried out by Commissions and what new structure would be put into place.

Action to be taken—priority projects
The Secretary proposed a list of priority areas which the Commission should concentrate on completing in the next three years (or less). In most cases these were already in place, except for the more major revision of the General Nomenclature. He would make more detailed proposals for Berlin.

Any response to Division/Secretariat
The need for more details of replacements to be discussed in Berlin rather than in 2001.

Discussion of current projects

'Mobile phases for liquid chromatography'. Part I Descriptive terminology, Project 530/9/95, Author: Siskos and co-workers

Part I. Terminology and definitions. A draft paper had been circulated—some terms such as eluent/mobile phase needed complementary definitions to the stationary phases definitions recently adopted. R.M.S. to revise and return to authors.

Part II. Discussion paper on mobile phase properties: to be developed as a critical review of mobile phase properties directly related to chromatography. It was thought that this could be developed as a critical data compilation paper on the properties of compounds com-

monly used as eluents in HPLC which would provide values relevant to chromatographic applications. To be proposed as a project in Berlin and a working party established

'Nomenclature for Analytical electromigration techniques', Project 530/10/95, Author: Riekkola

A paper was presented by Prof. Riekkola. A detailed discussion examined a number of the criteria and particular concern was felt about the distribution constant related to micellar methods because it was effectively the inverse of the conventional use of distribution in chromatography. k_{mc} was proposed to make the distinction.

It was felt that the paper should concentrate on capillary methods and the title of the final proposals would reflect this. (Where possible definitions and terms applicable to other electromigration methods would be used.) M.L.R. to revise, and the paper would be circulated by email for comment.

'Nomenclature for chromatography of polymers and related substances'. Author: Berek, Commission IV project.

A working party had been established but so far no paper had been produced—a joint Commission meeting would be organized in Berlin.

Field flow fractionation—Project 530/11/97, Jönnson). The authors (Beckett) had agreed to produce a shortened paper of 5–10 pages but a copy was still awaited.

Definition of dead volume in chromatography—Project 530/12/97 (Garcia-Dominguez). Draft papers have been circulated for comment, The 4th version was discussed in detail and some additional practical results on exchanges between static and bound mobile phase was reported which will lead to a further revision being produced. All the mobile phase in the column appeared to be involved.

It was suggested that the paper should include a conclusion from the comparisons, and recommend methods or a discussion of best practice where the conclusion is ambiguous.

Retention parameters in gas chromatography—Project 530/13/97, Author: Prof. Davankov. Draft paper circulated for comment. Discussed and some revisions proposed. Extension to ~ zero outlet pressure was discussed to take GC-MS method into account. V.A.D. to revise and send to R.M.S. for comments on English.

Projects in Draft stage

1 *Sample preparation methods* (Jönnson to prepare paper). Felt to be a useful topic but needs a cross Commission structure because it overlaps into different areas. To be discussed in Berlin—it might gain from a new style cross Commission working party.

2 *Updating of Chromatography Nomenclature.* Following a discussion of problems present in Nomenclature for Chromatography document related to the definitions of retention volumes in gas chromatography it was agreed to initiate a project which would include:
- Updating of GLC nomenclature (J.V.H.)
- Detector definitions (R.M.S.) coupled detectors (K.J.)
- Definition and description of Modes of chromatography
- The Secretary will try and bring together a paper for Berlin of topics needing additional work.

3 *Integrators and quantitation.* This was felt to be an important area but also to have cross-Division implications, therefore a wider working party might be needed. As above, the topic was of interest in a number of areas. It was suggested that this might be an area where a practical round robin study was needed. Difficult under present structure but might be a future IUPAC activity.

4 *Definition of calculation of asymmetry.* This was a particular area of confusion and it was felt that a agreed proposal might be useful (J.A.J. to examine)

Report on revision of Orange book (Marton)

The Chairman reported that the Orange book had now been published and details were in *Chemistry International.*

Next Meeting at General Assembly, Berlin, 7–14 August, 1999. Year 2000 meeting to be decided. Final Meeting 2001 combined General Assembly and Congress—all current Commissions will be abolished December 2001.

The meeting ends with thanks to the local organizers for their assistance with the hotel, meeting facilities and their hard work in ensuring that all the members were transported from and to Madrid airport and had information on local travel.

Priority projects for 1999–2001

1 Analytical electromigration methods—Nomenclature (M.L.R.)
2 Hold-up time in LC and GC. A fundamental definition (J.G.D., V.A.D.)

3 Up-date of General nomenclature (R.M.S.)
(a) Gas chromatography—terms related to capillary chromatography (J.H.)
(b) Mobile phase terminology—many new terms since (P.S.)
(c) Detector definitions—generally omitted—much more needed many usage terms also in other Commissions. (R.M.S.) coupled (K.J.)
4 Data collection—some broader across Division
5 Integration
Peak shapes
Asymmetry
6 Definition of sample preparation terms—general across Division (J.A.J.)

Useful projects
1 Field flow fractionation (J.A.J.) (limited application)
2 Macromolecular separations (D.B., V.A.D.)
3 Definition of modes of chromatography (broad terms)

Less urgent aspects
1 Mobile phase properties (reviewed material—not definitions)

All for completion by 2001—plan full draft paper by 1999.

R. M. Smith
Secretary of Commission V.3

Commission in Microchemical Techniques and Trace Analysis—V.2

Minutes of Commission Meeting in Geneva, 24–25 August 1997

Status of Current Projects

All of the current projects and their status were thoroughly discussed in the commission. Several papers were cancelled, given to the Division or to press and others made good progress; the updated list of projects follows (see Table p. 182).

New Projects

The following new projects were initiated, and drafts presented at the meeting:
1 *Application of Inductively Coupled Plasma Mass Spectrometry to Speciation Studies* by D.T. Heitkemper, B.S. Zimmer, K Wolnik and J.A. Caruso, draft available, comments to L.G. Danielsson by 1 October 1997.
2 *Electrophoresis of metal species* by A. Timerbaev, comments to author or Boris Spivakov by 1 December 1997.
3 *Speciation Analysis for Metal-Biomacromolecule Complexes using Hyphenated Methods* by Rychard Lobinski, Comments to author by 31 December 1997.
4 Report *Enhancement of Environmental Analytical Laboratories in Third World Countries* by Prof. Lars Reutergardh *et al.*; this report has been sent to the Division.

in *statu nascendi* without draft

Direct derivatization of Organic Compounds at Trace Level Concentrations for Fluorescence Detection and Capillary Electrophoresis by Staffan Folestad

New structure of Commission V.2

A new structure of the Commission was adopted after thorough discussion of the options at hand. The results are as follows: all the working groups will be abandoned and only groups for smaller projects will be set up (such as the authors of a report)

The following position papers shall provide the outlines for future activities; the list of participants reflects the situation of the Commission after the elections of new members:

1 Hyphenated techniques for metal specific detectors, ***W. Lund***, *L.G. Danielsson, A. Timerbaev, J. Edmonds, R. Lobinski, K. Fujiwara*
2 Quality Assurance and Quality Control. ***E. Maier***, *J. Hlavay, W. Cofino*
3 Surface Characterization and Materials Science. ***G. Friedbacher***, *Yunsoo Kim, D. Hercules*
4 GC/MS for Organic Trace Analysis. ***W. Cofino***, *S. Pergantis, R. Morabito, R. van Cleuvenbergen*
5 Fractionation and Sequential Leaching. ***J. Hlavay***, *R. Morabito*

W. Cofino agreed to make a format for the preparation of the position papers (enclosed as an appendix). The papers are to be discussed at the meeting next year in Vesprem, Hungary.

The chairman thanked all leaving members for the scientific and personal contributions they have made over the past years. He expressed the hope that the contacts will not be terminated completely!

The venue of the next meeting was planned to be Vesprem, Hungary at the weekend following Euroanalysis in Basel.

M. Linscheid
Secretary of Commission V.2

Commission V.2—Current Projects

Status report—1 september 1997

Project no.	Title	Coordinator	Start	Review/ compl. date	Status (flowchart)
OTA521/9/89	Analytical Techniques for Trace Organic Compounds VII Extraction and Preconcentration of Some Environmental Trace Pollutants by Supercritical Fluid Extraction	L. Reuterg Drdh/ M. Linscheid	1990	1997	ready for the Commission in 1997
OTA 521/11/91	Analytical Techniques for Trace Organic Compounds/VII Applications of Negative Ion Chemical Ionization Mass Spectrometry	M.W. Linscheid/ D.G. Westmoreland	1992	1997	ready for the Commission in 1997
OTA521/12/95	Derivatization Reactions for Trace Analysis in HPLC	L.-G. Danielsson	1995	1998	in progress (8), draft in 1998
SAN 522/8/95	Classification of Scanning Probe Microscopies	G. Friedbacher	1995	1997	paper to commission secretary for Division
STE 523/2/89	Determination of Trace Elements Bound to Soils and Sediment Fractions	H. Muntau	1989	1997/ 1998	if not published, need complete update and approval by commission
STE523/3/89	Determination of Mercury Species in Environmental and Biological Samples	M. Morita	1989	1997/ 1998	revised draft available final draft with secretary
STE 523/4/89	Determination of Tin Species in Biological and Environmental Samples	M. Leroy	1989	1997	to the division via secretary
STE 523/6/91	Determination of Selenium Species in Biological Samples	J.S. Edmonds/ M. Morita/ M. Leroy	1991	1997	with the chairman for formal approval
STE 523/7/91	Determination of Phosphorus Species in Environmental Samples	H. Muntau/ B. Ya Spivakov	1991	1997	final version for publication before Geneva, available
STE523/8/93	Speciation Terminology	M. Morita (joint project)	1993	1997	progress made, 2nd draft in 1997
STE523/10/95	Determination of Selenium Species in Environmental Samples	C. Camara	1995	1997	J.S. Edmonds and R.Lobinski will continue
STE523/11/95	Determination of Iodine Species in Environmental and Biological Samples	J. Edmonds	1995	1997	with chairman for approval then to division (12)
	The QA projects will be merged into a Book: 'Quality management in chemical laboratories'	W.P. Cofino/ E.A. Maier	1997	1999	
QA524/2/91	Quality Improvement Programmes	E.A. Maier	1991	1996	draft available (9–10), input from commission expected
QA524/3/91	Method Development and Validation	C. Camara	1991	1997	draft available (9–10)
QA524/4/91	Quality Assurance of Environmental Sampling	J. Hlavay	1991	1997	draft available
QA524/5/91	Quality Control in Daily Practice	W.P. Cofino	1991	1996	draft available (9–10)
520/22/95	Enhancement of Environmental Laboratories in Third World Countries	W.P. Cofino/ L. Reuthergardh	1995	1997	L. Reutergardh agreed to continue with W.P. Cofino as responsible TM. Project to be terminated if no progress is made in 1999.
	New Projects				
	Speciation of Antimony	C. Camara			contact to C. Camara

Conference announcements

16th IUPAC Conference on Chemical Thermodynamics, Halifax, 6–11 August 2000, Nova Scotia, Canada

This conference brings together scientists who participate in thermodynamic research, in order to discuss the most recent research, and to stimulate new lines of research. A special goal of this conference is to include participants who make use of thermodynamic data, in order to guide research in areas where thermodynamic data are required and not presently available. This is especially important because the number of active thermodynamic researchers has decreased dramatically in the last few decades. This is an international problem, and it is hoped that this conference will address this problem, both through research interactions and through the symposium on teaching of thermodynamics. It is expected that the audience will be very international; the 1996 conference attracted participants from 39 countries.

Several subsections are planned; the following are (approximate) titles to date:

- Symposium on Standards (for NIST's 100th anniversary)
- Symposium on Thermodynamics of Materials (batteries, superconductors, etc.)
- Symposium on the Relationship between Theoretical Chemistry and Experimental Chemical Thermodynamics (highlighting areas in which experimental data are needed)
- Symposium on Thermodynamics Education
- Symposium on Biological Thermodynamics.

Novel Porphyrinoids and their Metal Complexes, Berlin, 17 August 1999

'Novel Porphyrinoids and their Metal Complexes', A Micro Symposium, will be held on 17 August 1999, during the 37th IUPAC Congress/27th GDCh General Meeting, 14–19 August 1999, Berlin, Germany. The main theme of the Congress is: 'Frontiers of Chemistry—Molecular Basis of Life Sciences'. The Micro Symposium is being jointly organized by the GDCh and the Biomolecular Chemistry Committee of the IUPAC. It will feature: Chemistry, Photophysical Properties and Biomedical Aspects.

Chairs: U.K. Pandit, Amsterdam, (Netherlands) and E. Vogel, Koeln (Germany). Speakers: R. Guilard, Dijon (France); T.D. Lash, Normal IL (USA); L.Latos-Grazynski, Wroclaw (Poland); J.S. Lindsey, Raleigh NC (USA); A. Osuka, Kyoto (Japan); J.L. Sessler, Austin TX (USA); E. Vogel, Koeln (Germany); N.G. Vorozhtsov, Moscow (Russia).

Further Information will be available in the Second Circular and the updated webpages <http://www.gdch.de/tagung/1999/iupac_hv/index.htm> in Spring 1999. Gesellschaft Deutscher Chemiker, IUPAC 99, PO Box 90 04 40, D-60444, Frankfurt am Main. Germany. Tel.: +49 69 7917 358/360/366; Fax: +49 69 7917 475, Email: <tg@gdch.de>, Homepage <http://www.gdch.de>.

IFCC–WORLDLAB

17th International and 13th European Congress of Clinical Chemistry and Laboratory Medicine, Firenze, Italy, 6–11 June 1999

The Programme for this event is given below. The 3rd Announcement can be found on the Internet at <http://www.worldlab99.it>.

Opening lecture

Arthur Kornberg—1959 Nobel Laureate in Medicine, Stanford University, Stanford, CA, USA.

- Achievements and Perspectives in Medical Biotechnologies

Plenary lectures

Apoptosis—Prof. Shiegakazu Nagata, Department of Genetics, Osaka University Medical School, Osaka, Japan

The T helper 1 (Th1) and T helper 2 (Th2) Paradigm in Human Diseases—Prof. Sergio Romagnani, Head of the Institute of Internal Medicine and Immunology, University of Firenze, Firenze, Italy.

Proteome Research and its Impact on Laboratory Medicine—Prof. Denis Hochstrasser, Head of the Central Clinical Chemistry Laboratory, Geneva University Hospital, Geneva, Switzerland.

Genetics and Environment—Prof. John Burn, Head of the Department of Human Genetics, University of Newcastle, Newcastle upon Tyne, UK.

From Genome Sequence to Protein Functions—Prof. C. Thomas Caskey, Senior Vice President Merck Research Laboratories West Point, PA, USA.

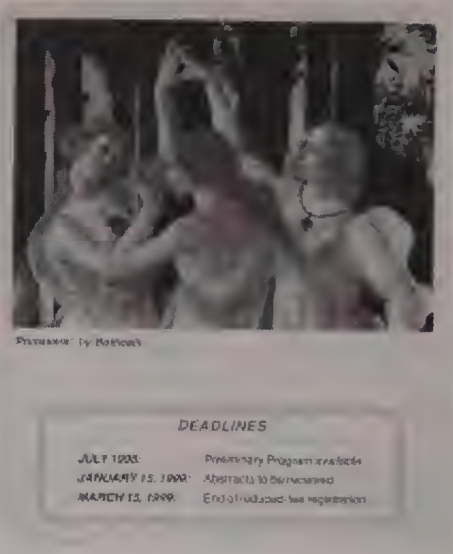
Symposia—tentative programme

Clinical Molecular Biology Symposia

1 New Tools in Genetic Analysis: the Emerging Biochip Technologies
2 Standardization and Quality Control of Molecular Biological Techniques in Clinical Laboratory (in collaboration with the International Union of Biochemistry and Molecular Biology—IUBMB)
3 Diagnostic Molecular Microbiology: Current and Future Trends
4 Molecular Markers in Solid Tumors
5 Molecular Diagnostic and Prognostic Markers in Haematological Malignancies
6 From Genotype to Phenotype
7 Genetic Analysis of Common Diseases
8 Gene Therapy: Promise and Reality
9 Genetic-Based Drug Responses

Clinical Chemistry and Laboratory Medicine Symposia

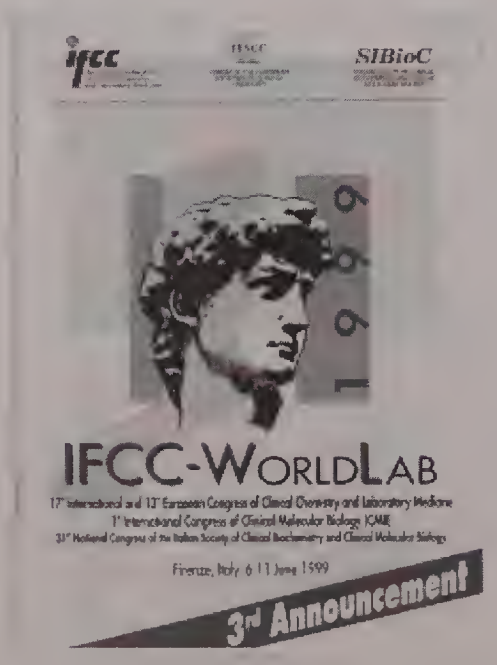
10 Robotics, Automation and the Virtual Laboratory
11 Biosensors and Non-Invasive Technology
12 Advanced Mass Spectrometry as a Diagnostic Tool
13 Electrophoresis and High Resolution Separation Techniques
14 Animal Models on Human Diseases
15 Endothelial Cells—Functional and Diagnostic Aspects
16 Receptors and Other Surface Markers
17 Novel Aspects of Haemostasis and Thrombosis
18 Computer-assisted Decision-making Activated by Clinical Laboratory Finc
19 Assessment of Male Fertility and Infertility
20 New Trends in Obesity and Diabetes
21 Environmental Risks for Human Health
22 Standardization and Reference Materials for Immunoassays
23 High Sensitivity and Multi-analyte Immunochemical Methods



24 Microbial Agents and Cardiovascular Diseases
25 Critical Care (AVL Awards Session)
26 Ion Channel Diseases
27 Assessment of Nutritional Status
28 Oxidants and Antioxidants in Clinical Biochemistry
29 Ageing and Neurological Diseases
30 Role of the Laboratory in Medical-Assisted Fertilization—I (confirmation pending)
31 Regulation of Gene Expression in Inflammation: Tool and Target for Therapeutic Applications
32 Biochemical and Genetic Markers of Atherosclerosis
33 Standardization in Clinical Chemistry
34 Therapeutic Drug Monitoring and Clinical Toxicology
35 Biochemical and Genetic Tumor Markers

Economics & Management Symposia

38 Organizational Structure of Laboratories in Europe
39 Accreditation in Clinical Chemistry
40 The Laboratory Influencing Clinical Practice—Past, Present and Future
41 The Changing Face of Laboratory Medicine
42 External Quality Assessment Programmes
43 Projects for Quality Improvement in Developing Countries
44 The Role of the Laboratory in Evidence-Based Medicine
45 PUSH (Public Understanding of Science and Health)



The 30th annual one-week short course, 'Advances in Emulsion Polymerization and Latex Technology', will be offered at Lehigh University during the week of 7–11 June 1999

This course is designed for engineers, chemists, other scientists and managers who are actively involved in emulsion work and for those who wish to develop expertise in the area.

The course is an in-depth study of the synthesis and properties of high polymer latexes. The subject matter includes a balance of theory and applications as well as a balance between chemical and physical problems. Lectures, given by leading academic and industrial workers, begin with introductory material and review, and progress through recent research results. The course fee is $1000 for the entire week or $350 per day for any part.

Further information can be obtained from: Dr Mohamed S. El-Aasser, Emulsion Polymers Institute, Lehigh University, I 11 Research Drive, Bethlehem, PA 18015, USA. Tel.: (610) 758-3082; Fax: (610) 758-5880; E-mail: <mse0@lehigh.edu>

International Dairy Federation Symposium Laboratory Accreditation & Proficiency Testing, 19 April 1999, Convention Centre, Ottawa, Canada

This symposium will be held during the IDF/ISO/AOAC Analytical Week, which will take place from 18 to 23 April 1999.

Objectives

The symposium will deal with the subject of Laboratory Accreditation and Proficiency Testing. In a relatively short time Laboratory Accreditation has become essential for every laboratory involved in enforcement and an invaluable asset for any laboratory selling its services to other clients. Proficiency Testing is a recognized tool for maintaining accreditation.

The objectives are:

- to harmonize analytical methods & test results,
- to monitor laboratory & analyst performance on an on-going basis,
- to provide users with increased confidence in the test data,
- to ensure mutual acceptance of test results in import & export of products.

Special emphasis will be given to the following items:

- importance of Laboratory Accreditation on a more International basis
- compliance of International standards for Laboratory Accreditation impact of International requirements
- International guidelines for Proficiency testing
- equivalency determination

But Laboratory Accreditation is very time-consuming for laboratory managers. It must be carried out successfully. The object of the seminar is to consider the mechanisms, pitfalls and advantages of Laboratory Accreditation, the documentation available to guide the accreditee and the essential requirements for Proficiency Testing to be useful in Laboratory Accreditation.

31st International Chemistry Olympiad, 4–11 July 1999, Bangkok

Thailand will play host to about 60 nations participating in the 31st International Chemistry Olympiad. Further information can be obtained from the Chairman, Dr Bhinyo Panijpan; E-mail: <icho31@ku.ac.th>; Fax: (662) 942-8715.

AACC Oak Ridge Conference, 23–24 April 1999

Call for abstracts

AACC's highly respected 31st Annual Oak Ridge Conference will take place in San Jose, California, USA, on 23 and 24 April 1999. The title of the conference will be 'On the Road to Non-Invasive Testing: The New Millennium of Minimally Invasive and Non-Invasive Technologies in Clinical Settings'.

The conference committee is inviting abstract submissions on the following topics: immunoassay technologies, DNA/RNA-based technologies, biosensors, minimally and non-invasive testing, and point-of-care testing. Abstracts may be submitted via the AACC website <http://www.aacc.org www.aacc.org/meetings/oakridge> or via post.

Contact: AACC Customer Service, 2010 L Street, NW, Suite 202, Washington, DC 30037-1526, USA. Tel.: (202) 857-0717, fax: (202) 833-5093 , e-mail: <custserv@aacc.org> for more information. Deadline for submission is Friday, 30 October 1998.

1st Workshop on Global Phase Diagrams, Walberberg near Cologne, Germany, 21–24 March 1999

Global Phase Diagrams, as introduced by van Konynenburg and Scott, are maps providing an overview of the phase behaviour of binary fluid mixtures. The investigation of Global Phase Diagrams is a powerful method for understanding phase equilibrium phenomena of mixtures in general. The objective of the workshop is to report achievements and recent developments in this area and its extension to new fields of application.

Theoretical or experimental papers are invited that deal with the systematic investigation of:

- the influence of interaction parameters on mixing phenomena
- equations of states or lattice models for pure, binary or multicomponent mixtures
- the influence of interaction or geometry parameters on adsorption phenomena or separation factors
- interference of solid and fluid phases in mixtures

- phase phenomena in reacting systems
- classification of phase diagrams

For details and registration see the workshop web page at: <http://van-der-Waals.pc.uni-koeln.de/1stGPD/register.html>

Prof. Dr Ulrich K. Deiters and Priv.-Doz. Dr Thomas Kraska Thermodynamics Center, Institute of Physical Chemistry, University at Cologne, Luxemburger Str. 116, D-50939 Köln, Germany.

Dr Leonid Z. Boshkov, State Academy of Refrigeration, Odessa, Ukraine. Tel.: + 49 221470 4543, fax: + 49 221470 4900, e-mail: <deiters@stthd0.pc.uni-koeln.de> or <Kraska@stthd0.pc.uni-koeln.de>

EMRS-99 Spring Conference June 1–4, 1999, Strasbourg, France

First call for papers

Conference Programme:
<http://www-emrs.c-strasbourg.fr/99prog.htm>

Symposium A	Photo-Excited Processes & Applications ('3-ICPEPA')
Symposium B	Protective Coatings & Thin Films 99
Symposium C	Progress in Computational Materials Science
Symposium D	Plasma & Ion Surface Engineering
Symposium E	Advances in Silicon Substrates
Symposium F	Process Induced Defects in Semiconductors
Symposium G	Material Physics Issues & Applications of Magnetic Oxides
Symposium H	Strain in Materials: Analysis, Relaxation & Properties
Symposium I	Microcrystalline & Nanocrystalline Semiconductors
Symposium J	Materials for Coherent Optics
Symposium K	Materials, Process and Technology for Optical Interconnect
Symposium L	*Ab-Initio* Approaches to Microelectronics Materials and Process Modelling
Symposium M	Basic Models to Enhance Reliability in Si-Based Devices and Circuits
Symposium N	Molecular Optoelectronics: Materials, Physics and Devices
Symposium O	Chalcogenide Semiconductors for Photovoltaics
Symposium P	Optical Characterization of Semiconductor Layers and Surfaces

News and notices

37th IUPAC Congress—travel grants

Young scientists from developing countries and less developed countries may apply for travel and accomodation grants to participate in the 37th IUPAC Congress. These grants are co-sponsored by IUPAC, UNESCO and the German Chemical Society (GDCh). Applicants for grants are encouraged to participate actively with a poster contribution (deadline 1 March 1999; see details on the Internet <http://www.gdch.de>) . There will be a special programme to bring together grantees and young host scientists from European countries. Details can also be found on the conference web pages.

New observer countries

The applications of the Cuban Chemical Society and the Pancyprian Union of Chemists for Observer Country status have been approved by the EC/Bureau.

Roland Andersson Named Executive Director of Chemical Institute of Canada

Terry Rummery, Chair of the Board of the Chemical Institute of Canda (CIC), is pleased to announce the appointment of Roland Andersson, as Executive Director. Roland graduated from the University of Winnipeg in 1976 with a 4-year BSc in chemistry. He has over 20 years of management experience in the chemical field, acquired through responsibilities in research and development, operations, marketing and administration, in both chemical manufacturing companies and non-profit organizations.

He became involved early on in his career with the Canadian Manufacturers of Chemical Specialties Association (CMCS). Roland participated in the development and communication of industry positions to government on such issues as the Canadian Environmental Protection Act (CEPA) and Workplace Hazardous Materials Information System (WHMIS). He was active on the Board from 1985 to 1994, which included his 1990–1991 term as Chair.

His operational and marketing experience in the chemical field led him to the Major Industrial Accidents Council of Canada (MIACC) in 1994 in the newly created position of Marketing Director. In a membership campaign, more than 15 trade associations and 80

companies joined the MIACC in three years, an accomplishment that Andersson credits to the Board's strong team spirit. He became Director of Technical Programmes in 1995. Through the voluntary efforts of a Technical Management Committee, supported by the Board and membership, Roland coordinated the development and implementation of a national programme for the voluntary control of major hazards.

Forming Andersson & Associates in 1997, he has undertaken national and international projects with The Canadian Chemical Producers' Association (CCPA) on climate change, for Environment Canada on promoting Accelerated Reduction and Elimination of Toxics (ARET) to industry, and for the Intergovernmental Forum on Chemical Safety (IFCS) in the development of an international marketing and funding strategy.

A new name for the International Federation of Clinical Chemistry

The scientific, technological and organizational changes in health care that are taking place in most countries challenged the IFCC Executive Board to consider the advantages of updating the name of the federation. The basis for this proposal arose during the development of the IFCC strategic plan. While the IFCC will continue to strive for excellence in the profession of laboratory analysis—two considerations about the organization's role have emerged. On the one hand, there is increasing use of techniques of chemical and molecular biology in related fields, which are not strictly subsumed in clinical chemistry. On the other, there is a huge increase in the potential use of laboratory data and diagnostic possibilities in preventive medicine. This requires substantial integration of demographic and clinical-medical information regarding the patient.

These reasons supported the decision of the IFCC Executive Board to ask the national societies affiliated with the IFCC to vote on extending its name to the International Federation of Clinical Chemistry and Laboratory Medicine. A majority of those voting approved this proposal in September 1997.

The Executive Board of the IFCC noted that it must be made clear that this name change in no way implies that laboratory sciences are the exclusive province of medical doctors. While it is clear in all countries that only physicians can provide therapy, diagnostic process today require the integration of skills in biochemistry, physiopathology, chemistry, physics, and so forth. These professional contributions are then used by some physicians for the final diagnosis and by other physicians in prescribing treatment.

Isotope geochemists—Website

Those of you who are interested in the use of stable isotopes in geochemistry should be aware of a website server ISOGEOCHEM at <http://geology.uvm.edu/isogeochem.html>. It is a useful way of getting information on any isotopic problem through its 'chat-line', and also provides information on conferences, positions vacant, short courses, student opportunities, suppliers and stable isotope laboratories. A particularly useful aspect is the 'archive' link which allows you to search for discussion on any previous item. ISOGEOCHEM has over 1100 subscribers in some 40 countries.

Obituary

Prof. O. Wichterle, the father of soft contact lenses, died on 18 August 1998 in the Czech Republic. Prof. Wichterle was the first President of the Macromolecular Division, 1967–71.

Recent reports

Recent reports published in *Pure and Applied Chemistry*

pH measurements in non-aqueous and mixed solvents: Predicting pH(PS) of potassium hydrogen phthalate for alcohol–water mixtures (Technical Report)

Synopsis: Predictive equations for estimating pH(PS) (PS = Primary Standard) of the potass ium hydrogen phthalate buffer in any aqueous–alcoholic mixture are given as functions of the alcoholic moiety mole fraction, x, in the mixture and of the relative permittivity, ε, and the autoprotolysis constant, pK_{ap}, of the pure alcohol at 298.15 K. The two equations, one valid for 298.15 K and the other covering the 263–318 K temperature range, have been optimized by using the experimental data for pH(PS) in aqueous mixtures with the following alcohols: methanol, ethanol, propan-2-ol, ethane-1,2-diol, 2-methoxyethanol ('methylcellosolve'). The equations, tested on subsets generated from the full set by removing an entire co-solvent at a time, provide predicted pH(PS) values which differ from the 'true' ones by less than 0.1 pH over the entire range of co-solvent

composition: $0 < x \leq 0.75$. The predictive equations are recommended for calculating pH(PS) only in those aqueous–alcoholic media for which the corresponding experimental values are not available, and not as smoothing equations for water and its mixtures with the above-mentioned solvents.

This report was prepared for publication by: S. Rondinini, P.R. Mussini, T. Mussini and A. Vertova. Department of Physical Chemistry and Electrochemistry, University of Milan, Via Golgi 19, 20133 Milano, Italy. The full details are to be found in Pure Appl. Chem. *1998, **70**(7), 1419–1422.*

IUPAC Reports on Pesticides(40). Bound xenobiotic residues in food commodities of plant and animal origin (Technical Report)

Synopsis: In order to assess the dietary risk resulting from the use of pesticides or veterinary drugs, the nature of the chemical residues on food commodities needs to be determined. Elucidation of the nature of the chemical residue is carried out using radiolabelled studies, where the radiolabelled xenobiotic is applied or dosed in a manner which reflects its conditions of use. Food commodities are exhaustively extracted to remove the individual components of the residue. Once extracted, the identity and toxicological significance of the components can be assessed and, where appropriate, analytical methods developed to quantitatively determine the amount of the components in food items.

Depending on the characteristics of the components of the residue, the extraction regime may not remove all the chemical residue from the sample matrix. These residues are frequently characterized as being 'bound', however, the amount and nature of this residue will be highly dependent on the extraction regime used. To provide guidance and standardization, a definition of the term 'bound residues' is recommended. This definition builds on a previous IUPAC definition, but takes account of the current availability of enzyme systems, which effectively solubilize the entire matrix rather than extracting the residue. It is also recommended that where the extraction falls short of the full definition, then the residues should be termed as 'unextractable' and the conditions of the extraction should also be defined.

Where residues are bound, the assessment of dietary risk cannot be directly assessed, thus raising issues relating to the significance of the bound residue. The overall toxicological significance of a bound residue will depend primarily on its bioavailability and the level of exposure. In order to determine the bioavailability, study design is crucial in order to perform a critical safety assessment.

This report was prepared for publication by: M.W. Skidmore[1], G.D. Paulson[2], H.A. Kuiper[3], B. Ohlin[4] and S. Reynolds[5]. [1]Zeneca Agrochemicals, Jealotts Hill, Bracknell, UK. [2]State Institute for Quality Control of Agricultural Products, Wageningen, Netherlands. [3]US Department of Agriculture, ARS, Fargo, ND 58105, USA. [4]National Food Administration, Uppsala, Sweden. [5]Central Science Laboratories, York, UK. The full details are to be found in Pure Appl. Chem. *1998, **70**(7), 1423–1447.*

Critically evaluated propagation rate coefficients in free radical polymerizations—II. Alkyl methacrylates (Technical Report)

Synopsis: Propagation rate coefficients, k_p, with confidence ellipses of the Arrhenius parameters, are reported for bulk free-radical homopolymerizations of *n*-butyl and *n*-dodecyl methacrylate at ambient pressure and low conversion. The data, which are from independent experiments in two laboratories, were obtained by the pulsed-laser polymerization/size-exclusion chromatography method. They obey the consistency criteria established for this technique. Plotting the *n*-butyl and *n*-dodecyl methacrylate k_p data, together with the benchmark k_p values for methyl methacrylate and recent data for four other linear and branched alkyl methacrylates, clearly shows a pronounced family type behaviour of alkyl methacrylate k_p.

This report was prepared for publication by: Sabine Beuermann and Michael Buback. Institut für Physikalische Chemie der Universität Göttingen, Tammannstr. 6, D-37077 Göttingen, Germany. The full details are to be found in Pure & Appl. Chem. *1998, **70**(7), 1415–1418.*

Spectroelectrochemistry. A survey of *in situ* spectroscopic techniques (Technical Report)

Synopsis: In this technical paper a summary of the available *in situ* spectroelectrochemical methods, their basic principles, their typical applications, and their limitations is given. With respect to the names of the methods and usual abbreviations, the paper follows the literature as far as possible, but tries to point out inconsistencies. An introductory section gives a summary of the basic equations and introduces the IUPAC recommendations for quantities and symbols.

This report was prepared for publication by: W. Plieth[1], G.S. Wilson[2] and C. Gutiérrez de la Fe[3]. [1]Institut für Physikalische Chemie und Elektrochemie, Technische Universität Dresden, Bergstr. 66b, D-01062 Dresden, Germany. [2]Department of Chemistry, University of

Kansas, Lawrence, KS 66045, USA. [3]Instituto de Quimica Fisica 'Rocasolano', Calle Serrano 119, Madrid 28006, Spain. The full details are to be found in Pure Appl. Chem. *1998, **70**(7), 1395–1414.*

Analytical aspects of chemically modified electrodes: classification, critical evaluation and recommendations (IUPAC Recommendations 1998)

Synopsis: Analytical aspects of chemically modified electrodes (CMEs) are critically reviewed. Effects of analyte and/or reagent accumulation, chemical transformation, electrocatalysis, permeability, ionic equilibria, controlled release and change of mass, as well as combinations of these effects are evaluated and classified. In addition, relevant definitions are provided and recommendations formulated for the most effective CME operation.

This report was prepared for publication by: Wlodzimierz Kutner[1], Joseph Wang,[2] Maurice L'her,[3] and Richard P. Buck[4]. [1]Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44, 01-224 Warsaw, Poland. [2]Department of Chemistry and Biochemistry, New Mexico State University, Las Cruces, NM 88003, USA. [3]Faculté des Sciences et Techniques, URA CNRS 322, 6 avenue V. Le Gorgeu, B.P. 809-29285, Brest Cedex, France. [4]Department of Chemistry, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA. The full details are to be found in Pure Appl. Chem. *1998, **70**(6), 1301–1318*

Glossary of terms used in medicinal chemistry (IUPAC Recommendations 1998)

Synopsis: The objective of this glossary is to provide, in a single document, a consistent terminology and concise definitions of terms covering the various aspects of medicinal chemistry. This was felt necessary with regard to the rapid changes occurring in medicinal chemistry and also by the need to establish international definition standards. Effectively the possibility exists that in different countries certain terms may not have the same meaning, in such a case the creation of an internationally accepted definition is particularly justified.

A Working Party belonging to the IUPAC Section on Medicinal Chemistry has therefore been assembled which prepared the present glossary. Concise but sufficiently explanatory definitions have been formulated for about one hundred commonly employed terms which can be considered of particular interest to the medicinal chemistry community. The glossary has been compiled in part from definitions proposed by the Working Party, in part from earlier IUPAC glossaries, and in part from well-accepted definitions taken from the literature but which were sometimes published in journals or books that may not be readily accessible.

This report was prepared for publication by: C.G. Wermuth[1], C.R. Ganellin[2], P. Lindberg[3] and L.A. Mitscher[4]. [1]Faculté de Pharmacie, Université Louis Pasteur, Strasbourg, France. [2]University College London, London, UK. [3]Astra Hässle AB, Mölndal, Sweden. [4]School of Pharmacy, University of Kansas, Lawrence, Kansas, USA. The full details are to be found in Pure Appl. Chem. *1998, **70**(5), 1129–1143.*

Guidelines for presentation of methodological choices in the publication of computational results. A. *Ab initio* electronic structure calculations (IUPAC Recommendations

Synopsis: Guidelines are presented to assist authors in preparing manuscripts that describe the results of *ab initio* computation. These guidelines are not intended to recommend how *ab initio* calculations should be done, but rather to ensure that the reader can have a clear understanding of what was actually carried out. They are written in a form to facilitate reprinting in original research journals and as information sheets that can be distributed to authors and reviewers.

This report was prepared for publication by: James E. Boggs, Department of Chemistry, The University of Texas, Austin, Texas 78712, USA. The full details are to be found in Pure Appl. Chem. *1998, **70**(4),1015–1018.*

Guidelines for calibration in analytical chemistry—Part 1: Fundamentals and single component calibration (IUPAC Recommendations 1998)

Synopsis: This IUPAC nomenclature document has been prepared to establish a uniform and meaningful approach to terminology, notation and formulation for calibration in analytical chemistry. In this first part, the general fundamentals of calibration are presented, namely for both relationships of qualitative and quantitative variables (relations between variables characterizing certain types of analytes and measured signals in certain positions of a measured function on the one hand and between variables characterizing the amount or concentration of the chemical species and the intensities of the measured signals, on the other hand). On this basis, the fundamentals of the common single component calibration which models the relationships

$y = f(x)$ between the signal intensities y and the amounts or concentration are represented. Additional papers will be prepared dealing with extensive relationships between several signal intensities and analyte contents, namely with multivariate calibration and with optimization and experimental design.

This report was prepared for publication by: K. Danzer and L. A. Currie, The full details are to be found in Pure Appl. Chem. *1998, **70**(4), 993–1014.*

Definitions of terms relating to the nonultimate mechanical properties of polymers (IUPAC Recommendations 1998)

Synopsis: The document gives definitions of terms related to the nonultimate mechanical behaviour of polymeric materials, in particular bulk polymers and concentrated solutions and their elastic and viscoelastic properties. The terms which have been selected are those met in the conventional mechanical characterization of isotropic polymeric materials. They have additionally been limited to those which can be defined precisely and with mathematical rigour. They are arranged in sections dealing with basic definitions of stress and strain, deformations used experimentally, stresses observed experimentally, quantities relating stress and deformation, linear viscoelastic behaviour and oscillatory deformations and stresses used experimentally for solids. An index, an alphabetical list of terms and a glossary of symbols are included for ease of reference.

This report was prepared for publication by: A. Kaye (UK), R.F.T. Stepto (UK), W. J. Work (USA), J. V. Alemán (Spain), A. Ya. Malkin (Russia). The full details are to be found in Pure Appl. Chem. *1998, **70**(3), 701–754.*

Nomenclature, symbols, units and their usage in spectrochemical analysis—XIV. Laser-based atomic spectroscopy: Proposal for a new notation (IUPAC Recommendations 1998)

Synopsis: This report is the 14th in a series on Spectrochemical Methods of Analysis issued by IUPAC Commission V.4. Because of the complexity and the lack of uniformity of the present nomenclature (e.g. '2 step excited resonance fluorescence', 'resonance enhanced multiphoton ionization', etc.) a new way is needed to describe these transitions. The aim of this document is therefore to present a new notation, the IUPAC Notation, to describe the various processes involved in atomic laser spectroscopy. Using a few assumptions, this notation has the advantage of being simple and systematic. States and processes can be described in a general way irrespective of the type of laser spectrometry.

This report was prepared for publication by: N. Omenetto,[1] J.-M. Mermet,[2] G.C. Turk,[3] and D. S. Moore[4]. [1]Joint Research Centre, Ispra Establishment, I-21020 Ispra (Varese), Italy. [2]Department of Spectroscopic Analysis, Université de Lyons, Lyons, France. [3]Inorganic Analytical Research Division, NIST, Gaithersburg, MD 20899, USA. [4]Chemical Science and Technology Division, Los Alamos National Laboratory, Los Alamos, NM 87544, USA. The full details are to be found in Pure Appl. Chem. *1998, **70**(2), 517–526.*

History of the recommended atomic-weight values form 1882 to 1997: A comparison of differences from current values to the estimated uncertainties of earlier values (Technical Report)

Synopsis: International commissions and national committees for atomic weights (mean relative atomic masses) have recommended regularly updated, best values for these atomic weights as applicable to terrestrial sources of the chemical elements. Presented here is a historically complete listing starting with the values in F.W. Clarke's 1882 recalculation, followed by the recommended values in the annual reports of the American Chemical Society's Atomic Weights Commission. From 1903, an International Commission published such reports and its values (scaled to an atomic weight of 16 for oxygen) areused here in preference to those of national committees of the UK, Germany, Spain, Switzerland and the USA. We have, however, made scaling adjustments from Ar(^{16}O) to Ar(^{12}C) where not negligible.

From 1920, this International Commission constituted itself under the International Union of Pure and Applied Chemistry (IUPAC). Since then, IUPAC has published reports (mostly biennially) listing the recommended atomic weights, which are reproduced here. Since 1979, these values have been called the 'standard atomic weights' and, since 1969, all values have been published with their estimated uncertainties. Few of the earlier values were published with uncertainties. Nevertheless, we assessed such uncertainties on the basis of our understanding of the likely contemporary judgement of the values' reliability. While neglecting remaining uncertainties of 1997 values, we derive 'differences' and a retrospective index of reliability of atomic-weight values in relation to assessments of uncertainties at the time of their publication. A striking improvement in reliability appears to have been achieved since the commissions have imposed upon themselves the rule of recording

estimated uncertainties from all recognized sources of error.

This report was prepared for publication by: T. B. Coplen and H. S. Peiser, U.S. Geological Survey, 431 National Center, Reston, VA 20192, USA. The full details are to be found in Pure Appl. Chem. *1998,* ***70****(1), 237–257.*

Isotopic compositions of the elements 1997 (Technical Report)

Synopsis: The Commission's Subcommittee for the Isotopic Composition of the Elements (SIAM) has carried out its biennial review of isotopic compositions, as determined by mass spectrometry and other relevant methods. This involves a critical evaluation of the published literature, element by element, and forms the basis of the table of isotopic compositions of the elements as determined by mass spectrometry presented here. New guidelines have been used to arrive at the uncertainties on the isotopic abundances and there are numerous changes to the table since it was last published in 1991. Atomic weights calculated from this table are consistent with Ar(E) values listed in the T*able of Standard Atomic Weights 1997*.

This report was prepared for publication by: K.J.R. Rosman[1] and P.D.P. Taylor[2]. [1]Department of Applied Physics, Curtin University of Technology, GPO Box U1987, Perth 6001, Australia. [2]Institute for Reference Materials and Measurements, European Commission-JRC, B-2440 Geel, Belgium. The full details are to be found in Pure Appl. Chem. *1998,* ***70****(1), 217–235.*

Nomenclature of fused and bridged fused ring systems (IUPAC Recommendations)

Synopsis: These recommendations constitute a comprehensive documentation for naming fused ring systems and bridged fused ring systems. It expands and extends the recommendations given in rules A-21, A-22, A-23, A-34, B-3 of the IUPAC Nomenclature of Organic Chemistry, Sections A, B, C, D, E, F and H, 1979 and rule R-2.4.1 of A Guide to IUPAC Nomenclature of Organic Compounds, 1993. Any ring system with two or more rings ortho- or ortho- and peri-fused together may be named by these recommendations. Two rings which are ortho-fused together have only two atoms and one bond in common. The nomenclature of spiro systems and von Baeyer nomenclature will be considered in separate recommendations.

This report was prepared for publication by: G.P. Moss. Department of Chemistry, Queen Mary and Westfield College, Mile End Road, London, E1 4NS, UK. The full details are to be found in Pure Appl. Chem. *1998,* ***70****(1), 143–216.*

Recommendations for the presentation of NMR structures of proteins and nucleic acids (IUPAC Recommendations 1998)

Synopsis: The recommendations presented here are designed to support the easier communication of NMR data and NMR structures of proteins and nucleic acids through unified nomenclature and reporting standards. Much of this document pertains to the reporting of data in journal articles; however, in the interest of the future development of structural biology, it is desirable that the bulk of the reported information be stored in computer-accessible form and be freely accessible to the scientific community in standardized formats for data exchange. These recommendations stem from an IUPAC-IUBMB-IUPAB interunion venture with the direct involvement of ICSU and CODATA. The Task Group has reviewed previous formal recommendations and has extended them in the light of more recent developments in the field of biomolecular NMR spectroscopy. Drafts of the recommendations presented here have been examined critically by more than 50 specialists in the field and have gone through two rounds of extensive modification to incorporate suggestions and criticisms.

This report was prepared for publication by: John L. Markley[1], Ad Bax[2], Yoji Arata[3], C.W. Hilbers[4], Robert Kaptein[5], Brian D. Sykes[6], Peter E. Wright[7] and Kurt Wüthrich[8]. [1]Department of Biochemistry, University of Wisconsin-Madison, Madison, WI, USA. [2]Laboratory of Chemical Physics, NIDDK, National Institutes of Health, Bethesda, MD, USA. [3]Water Research Institute, Tsukuba, Japan. [4]Laboratory of Biophysical Chemistry, University of Nijmegen, the Netherlands. [5]Department of Chemistry, University of Utrecht, the Netherlands. [6]Department of Biochemistry, University of Alberta, Edmonton, Alberta, Canada. [7]Department of Molecular Biology, The Scripps Research Institute, La Jolla, CA, USA. [8]Institut für Molekularbiologie und Biophysik, ETH Hönggerberg, Zürich, Switzerland (convenor of the task group to whom correspondence should be addressed).The full details are to be found in Pure Appl. Chem. *1998,* ***70****(1), 117–142.*

Books and other publications

New Approaches in Polymer Synthesis

Macromolecular Symposia, Vol. 128, pp. 1–254, March 1998.
Invited lectures presented at the IUPAC International Symposium on New Approaches in Polymer Synthesis and Macromolecular Formation held in St. Petersburg, Russia, 16-20 June, 1997.

Symposium Editors: A. Yu. Bilibin and S.S. Skorokhodov

The International Symposium 'New Approaches in Polymer Synthesis and Macromolecular Formation' was organized by the Institute of Macromolecular Compounds of the Russian Science Academy and the Chemistry Department of Saint-Petersburg State University. It appeared to be a logical continuation of the St. Petersburg Polymer Meetings, well known due to the 1st and 2nd IUPAC Symposia 'Molecular Order and Mobility in Polymers'.

The final programme included 21 plenary lectures. The Symposium was divided into four sections:

A New approaches in chain-and step-growth polymerization
B Catalysis in polymer synthesis
C New macromolecular architecture
D Non-traditional methods of macromolecular formation.

The above division is somewhat arbitrary, reflecting the interconnection and interpenetration of the branches of contemporary polymer chemistry. The present volume includes the texts of 21 plenary and oral lectures.

Modified Polyolefins

Macromolecular Symposia, Vol. 129, pp. 1–172, March 1998.
Invited lectures presented at the 12th Bratislava IUPAC International Conference on Polymers: Modified Polyolefins for Advanced Polymeric Materials held in Bratislava, Slovak Republic, 25-28 August, 1997. Symposium.

Editor: E. Borsig

The aim of the Conference was to bring together scientists from academia and industry to stimulate the exchange of ideas on recent advances in chemistry and physics of modified polyolefins leading to advanced polymeric materials.

More than 120 scientists, from 23 countries of the five continents presented 10 invited lectures, 22 contributed papers and 51 posters.

The Conference covered the two main kinds of effective chemical modification of polyolefins: the catalytic systems in polyolefin production and during polyolefin processing using extruders as reaction vessels. New catalysts tolerating known catalyst poisons such as carbon monoxide in the co-polymerization with ethylene or methyl methacrylate and other vinyl-functional esters can be incorporated into polyethylene. They allow the control of molar mass, end groups, stereochemistry, monomer incorporation and morphology. In addition to isotactic poly(propylene) also syndiotactic, hemiisotactic poly(propylene)s are available in high yields. Polyethylene short-and long-chain-branching is controlled either by uniform ethylene copolymerization with 1-olefins using 'single-site' metallocene catalysts or by migratory polyinsertion of ethylene, respectively.

An alternative variation of the polyolefin structure by catalysts is the preparation of elastomeric poly(propylene), the properties of which are influenced by variation of the length of isotactic and atactic segments.

The incompatibility of polyolefins with other, mainly polar polymers, requires the adjustment of their apolar chains to more polar blend components using peroxide-initiated grafting of acrylic and maleic anhydride derivatives on to polyolefin chains. Many Conference contributions were also devoted to other kinds of functionalization of polyolefins, mainly poly(propylene), which could extend the possibilities of the preparation of entirely new materials, including polymer blends.

New effective methods of grafting of vinyl monomers on to polyolefins, mainly on poly(propylene) were also reported. The grafting of styrene on to poly(propylene) with more than 50% yield in the solid state seems to be very advantageous.

The results obtained in the preparation of polyolefin blends showed that reactively compounded polymer blends have generally better mechanical properties than the blend prepared only by mechanical mixing. It was illustrated in PP rubber blends and also during UHMW-PE spinning with reactive solvents. The presented contributions on interaction between polymer components in polyolefin blends like dispersion forces, the influence of the crystalline part on the miscibility and morphology of the blend, and adhesive properties of modified polyolefins on to metal have a practical importance for the development of the new advanced polyolefin materials.

The Impact of Electronic Publishing on the Academic Community—available online

The Proceedings of the International Workshop organized by Academia Europaea and the Wenner-Gren Foundation which took place in April 1997 is now freely available. Contact: Adam Marshall, Head of Marketing: +44 171 580 5530.

Information Technology affects all aspects of academic activity, whether in research, scholarship or education. A major revolution is taking place on how knowledge is being held and by whom. In the past, the main guardian of knowledge has been the academic community, with its related institutions of universities, libraries, learned societies, scholarly publishers, etc. That responsibility is rapidly being transferred to others, and yet the voice of academia is hardly being heard in this process.

In *The Impact of Electronic Publishing on the Academic Community*, experts from a wide variety of backgrounds discuss the plans for implementing electronic publishing in their specific subject areas. Topics covered include:

- The present situation and the likely future
- Legal and political issues
- The content and quality of academic communication
- Social and cultural issues
- Digital libraries and archiving of electronic information
- Access to scientific data repositories

The online version of this book is fully searchable with links from the text to references and hot links to other web sites and email addresses. There is a complete list of contributors and participants of the Workshop including contact details.

Edited by Ian Butterworth, Imperial College, London, UK, Wenner-Gren. ISBN 185578 122 0 hardback, 200 pages, GBP 75.00/USD 127.50.

Conference Calendar

Visit http://www.iupac.org for complete information and further links

1999

Functional dyes

31 May–4 June 1999
4th International Symposium on Functional Dyes, Osaka, Japan.
Prof. Yasuhiko Shirota, Faculty of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan. Tel.: +81 6 879 7364, fax: +81 6 877 7367, e-mail: isfd@chem.eng.osaka-u.ac.jp

Polymer systems

7 –10 June 1999
3rd International Symposium on Molecular Mobility and Order in *Polymer Systems, St. Petersburg, Russia.Symposium Chairman: Prof. A.A. Darinskii, Symposium Coordinator: Mrs I. Kovalenko, Institute of Macromolecular Coumpounds, Bolshoy pr. 31, St. Petersburg, 199004 Russia. Tel.: +812 213 2907, fax: +812 218 6869, e-mail: IMC@macro.spb.su*

CHEMRAWN

20–25 June 1999
CHEMRAWN XII—African Food Security and Natural Resource Management: The New Scientific Frontiers, Nairobi, Kenya.
Dr Pedro Sanchez, International Center for Research in Agroforestry, PO Box 30677, Nairobi, Kenya. Tel.: +254 2 521003, fax: +254 2 520023, e-mail: p.sanchez@cgnet.com

Memorial K.I. Zamaraev

28 June–2 July 1999
International Memorial K.I. Zamaraev Conference on Physical Methods for Catalytic research at the Molecular Level, Novosibirsk, Russia.
Prof. V.N. Parmon, Boreskov Institute of Catalysis, 5, Prosp. Akad. Lavrentieva, Novosibirsk, 630090, Russia. Tel.: +7 3832 343269, fax: +7 3832 343056, e-mail: parmon@catalysis.nsk.su

Biodiversity and Bioresources

11–15 July 1999
2nd International Conference on Biodiversity and Bioresources—Conservation and Utilization, Belo Horizonte, Minas Gerais, Brazil.
Prof. Alaide Braga de Oliveira, Faculdade de Farmacia—UFMG, Av. Olegario Maciel 2360, 30.180-112 Belo Horizonte, Brazil. Fax: +55 31 337 9076, e-mail: fernao@dedalus.lcc.ufmg.br

Polymerization methods

12–15 July 1999
39th Microsymposium, Advances in Polymerization Methods: Controlled Synthesis of Functionalized Polymers, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Advanced materials

15–18 July 1999
1st IUPAC Workshop on New Directions in Chemistry. Workshop on Advanced Materials: Nanostructured Systems (IUPAC-WAM-1), Hong Kong. Professor M.A. El-Sayed, School of Chemistry and Biochemistry, Georgia Institute of Technology Atlanta, GA 30332-0400, USA. Tel.: +1 404 894 0292, fax: +1 404 894 0294, e-mail: mostafa.el-sayed@chemistry.gatech.edu

Organo-metallic Chemistry

18–22 July 1999
10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10), Versailles, France.
Prof. J.P. Genet, Laboratoire de Synthese Selective Organique et Produits Naturels, E.N.S.C.P.—UMR CNRS 7573, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France. Tel.: +33 1 44 276743, fax: +33 1 44 071062, e-mail: genet@ext.jussieu.fr

Carotenoids

18–23 July 1999
12th International Symposium on Carotenoids, Cairns, Australia.
Prof. George Britton, School of Biological Sciences, The University of Liverpool, Crown Street, Liverpool, L69 3BX, UK. Fax: +44 (151) 794 4349.

Rheology of polymer systems

19–22 July 1999
19th Discussion Conference on the Rheology of Polymer Systems, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2 360341, fax: +420 2 367981, e-mail: sympo@imc.cas.cz

Ionic polymerization

19–23 July 1999
International Symposium on Ionic Polymerization, Kyoto, Japan.
Dr Shiro Kobayashi, Department of Materials Chemistry, Graduate School of Engineering, Kyoto University, Kyoto 606-01, Japan. Tel.: +81 75 753 5608, fax: +81 75 753 4911,e-mail: kobayashi@mat.polym.kyoto-u.ac.jp

Analytical science

25–30 July 1999
Analytical Science into the Next Millennium (SAC 99), Dublin, Ireland.
Prof. Malcolm R. Smyth, Faculty of Science, Dublin City University, Dublin 9, Ireland. Tel.: +353 1 704 5308, fax: +353 1 704 5032, e-mail: smythm@ccmail.dcu.ie

Solution chemistry

26–31 July 1999
XXVI International Conference on Solution Chemistry, Fukuoka City, Kyushu, Japan.
Prof. Hitoshi Ohtaki, Department of Chemistry, Faculty of Science and Engineering, Ritsumeikan University, 1-1-1 Noji-Higashi, Kusatsu 525, Japan. Tel.: +81 775 61 2777, fax: +81 775 61 2659, e-mail: ohtaki@bkc.ritsumei.ac.jp

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IUPAC General Assembly

7–13 August 1999
IUPAC Secretariat. Tel.: +1 919 485 8700, fax: +1 919 485 8706, e-mail: secretariat@iupac.org

IUPAC Congress

14–19 August 1999
Frontiers in Chemistry: Molecular Basis of the Life Sciences, Berlin, Germany.
Gesellschaft Deutscher Chemiker–GDCh, PO Box 90 04 40, 60444 Frankfurt Am Main, Germany. Tel.: +49 69 7917 358/360/366, fax: +49 69 7917 475, e-mail: tg@gdch.de

Colloquium Spectroscopicum Internationale

5–10 September 1999
31th Colloquium Spectroscopicum Internationale 1999, Ankara, Turkey.
Prof. Dr. O. Yavuz Ataman, Department of Chemistry, Middle East Technical University, TR-06531 Ankara, Turkey. Tel.: +90 312 210 3232, fax: +90 312 210 1280, e-mail: xxxicsi@rorqual.cc.metu.edu.tr

Macromolecule–metal complexes

6–10 September 1999
8th International Symposium on Macromolecule–Metal Complexes (MMC–VIII) Tokyo, Japan.
Prof. Eishun Tsuchida, Waseda University, Tokyo 169-50, Japan. Tel.: +81 3 5286 3120, fax: +81 3 3209 5522, e-mail: w169988@mn.waseda.ac.jp

2000

Bio-organic chemistry

30 January–4 February 2000
5th IUPAC Symposium on Bio-Organic Chemistry (ISBOC-V), New Delhi, India.

Prof. S. Ranganathan, Biomolecular Research Unit, Regional Research Laboratory, Trivandrum 695 019, India. Tel.: +91 471 491 459, fax: +91 471 490 186.

High temperature materials chemistry

4–10 April 2000
10th International Conference on High Temperature Materials Chemistry, Aachen, Germany.
Prof. K. Hilpert, Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik (IWE 1), 52425 Jülich, Germany. Tel.: +49 2461 61 3280, fax: +49 2461 61 3699, e-mail: k.hilpert@fz-juelich.de

Mycotoxins and Phycotoxins

21–25 May 2000
10th International IUPAC Symposium on Mycotoxins and Phycotoxins, Sao Paulo, Brazil.
Dr Myrna Sabino, Instituto Adolfa Lutz, AV Dr Arnaldo 355, Sao Paulo, Brazil, 01246-902. Fax: +455 (11) 853 3505, e-mail: Myrna@Sti.COM.BR

Organic Synthesis

1–5 July 2000
13th International Conference on Organic Synthesis (ICOS-13), Warsaw, Poland.
Prof. M. Chmielewski, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, PO Box 58, Poland. Tel.: +48 22 631 8788, fax: +48 22 632 6681, e-mail: ichos@ichf.edu.pl

Macromolecules

9–14 July 2000
38th International Symposium on Macromolecules (MACRO 2000), Warsaw, Poland.
Prof. Stanislaw Penczek, Polish Academy of Sciences, ul. Sienkiewicza 112, 90363 Lodz, Poland. Tel.: +48 42 81 9815, fax: +48 42 684 7126, e-mail: spenczek@bilbo.cbmm.lodz.pl

Coordination Chemistry

9–14 July 2000
34th International Conference on Coordination Chemistry (34-ICCC), Edinburgh, Scotland.
Prof. P. Tasker, Chairman, Dr John F. Gibson, Secretary, The Royal Society of Chemistry, Burlington House, London W1V OBN, UK, Tel.: +44 171 440 3321, fax: +44 171 734 1227, e-mail: gibsonj@rsc.org

Polymers In Medicine

17–20 July 2000
40th Microsymposium Polymers In Medicine, Prague, Czech Republic.
Dr Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Science of the Czech Republic, Heyovskeho na. 2, 162 06 Praha 6, Czech Republic. Tel.: +420 2360341, fax: +420 2367981, e-mail: sympo@imc.cas.cz

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on Chemical Thermodynamics, Halifax, Nova Scotia, Canada.
Dr Peter G. Kusalik, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia B3H 4J3, Canada. Tel.: +1 902 494 3627, fax: +1 902 494 1310. e-mail: kusalik@is.dal.ca

Natural products

1 September 2000
22nd International Symposium on the Chemistry of Natural Products, Sao Paulo, Brazil.
Dr M. Fátima das G.F. da Silva, Universidade Federal de Sao Carlos, Depto. de Quimica, Via Washington Luiz, km 235, CP676, Sao Carlos, Brazil. Tel.: +55 16 274 8208, fax: +55 16 274 8350, e-mail: dmfs@power.ufscar.br

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA eV—c/o 11th IBS, Theodor-Heuss-Allee 25, 60486 Frankfurt/Main, Germany. Tel.: +49 69 7564 205, fax: +49 69 7564 201, e-mail: info@dechema.de

Food Packaging

8–10 November 2000
2nd International Symposium on Food Packaging—Ensuring the Safety and Quality Food, Vienna, Austria.
Dr L. Contor, ILSI Europe, 83, Avenue E. Mounier, Box6, B-1200, Brussels, Belgium. Tel.: +32 (2) 762 0044, fax: +32 (2) 771 0014, e-mail: laura@ilsieurope.be

Visas

It is a condition of sponsorship that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all *bona fide* chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all *bona fide* chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting the IUPAC Secretariat should be notified without delay by the applicant.

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- to study topics of international importance to pure and applied chemistry which need standardization, or codification
- to co-operate with other international organizations which deal with topics of a chemical nature
- to contribute to the advancement and understanding of pure and applied chemistry in all its aspects

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Blackwell Science

0193-6484(199811)20:6;1-D

Printed in Great Britain by Alden, Oxford